THE

JOURNAL

OF

GAS LIGHTING,

WATER SUPPLY,

AND

SANITARY IMPROVEMENT.

88067

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LONDON:

WALTER KING,

11, BOLT COURT, FLEET STREET, E.C.

THE

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WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXXVI. No. 895.] LONDON, JULY 6, 1880. [32nd Year. Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
ERITH,
OFFICES:
2, CROSBY SQUARE,
LONDON, E.C.

GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
Several Prize Medals. Established over 20 Years.
These Paints are now used by all the London Gas Companies and most of the principal Country Gas Companies, on Gas-holders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
Supplied, mixed ready for use, or in paste, as desired.
TORBAY PAINT COMPANY.
Proprietors: STEVENS & CO.,
21, GREAT WINCHESTER STREET, LONDON.
Works: BRIXHAM, TORBAY.

TUBES.
Tubes and Fittings for Gas, Steam, Water, and Hydraulic purposes, plain, galvanized, white enamelled inside, or coated by Dr. Angus Smith's process, or oxidized by Professor Barff's patent process. Gas-fitters tools, brass cocks, &c.
JOHN SPENCER,
VULCAN TUBE WORKS,
WEST BROMWICH, STAFFORDSHIRE,
AND
97, CANNON STREET, LONDON.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL & CO.,
LIMITED,
Established at the commencement of Gas Lighting,
Manufacturers of
TUBES AND FITTINGS.
THREE PRIZE MEDALS,
Paris, 1878.
Head London Office:
145, QUEEN VICTORIA STREET.
ALMA TUBE-WORKS, WALSALL;
OLD PATENT TUBE-WORKS, WEDNESBURY.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
Manufacturers of
WET AND DRY GAS-METERS,
Licensees and Manufacturers of
HUNT'S
PATENT COMPENSATING METERS,
STREET-LAMPS, &c., &c.
Established 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM,
Manufacturers of
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
Sugar, Saltpetre, and all kinds of Pans.
Roofs, Girders, and Bridges, and General Smith's Work
London Offices: 97, CANNON STREET—
JAMES E. & SAMUEL SPENCER, Agents.

THE
"OTTO" GAS-ENGINE,
From ½ to 40 H.P. ind.
See Page 6.

CROSSLEY BROTHERS,
MANCHESTER AND LONDON.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.
ESTABLISHED 1840.

GEORGE GLOVER AND CO.,
PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
AND MANUFACTURERS OF
IMPROVED DRY GAS-METERS.
GOLD MEDAL. HIGHEST AWARD.

INTERNATIONAL EXHIBITION,
SYDNEY, 1880.
RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.
1, LANCASTER AVENUE, MANCHESTER.
Foreign Agents: DAHL BROS., Copenhagen; A. FAAS & CO., Frankfort-on-Maine; W. HOVEN & SON, Rotterdam; COPLAND & M'LAREN, Montreal; A. DEMPSTER, 57, Elizabeth Street, Melbourne.

WELLINGTON TUBE WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE.

JOSEPH AIRD,

GAS, STEAM, AND HYDRAULIC TUBES AND FITTINGS.

WARNER'S RETORT-HOUSE MACHINERY.

[*As Illustrated and Described in the* JOURNAL *for May* 4.]

Communications to be addressed to

W. J. WARNER, GAS-WORKS, SOUTH SHIELDS.

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

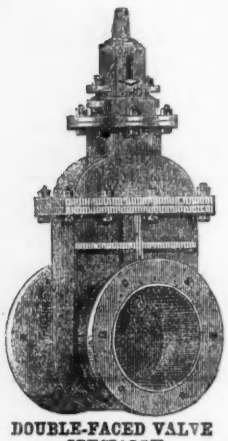
GAS APPARATUS;

CONTRACTORS FOR THE

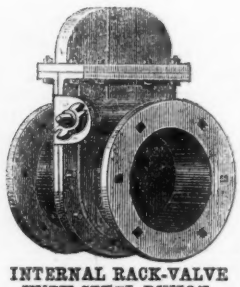
ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

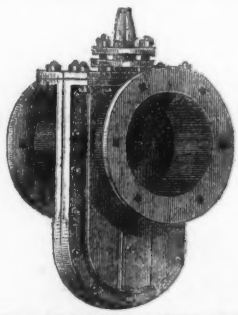
C. & W. WALKERS' GAS-VALVES.



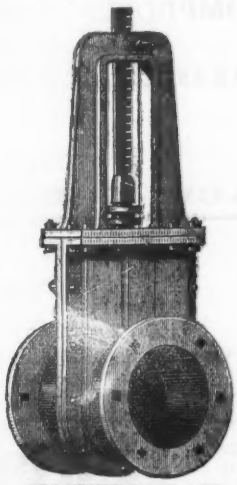
DOUBLE-FACED VALVE SPECIALLY FOR PURIFIERS.



INTERNAL RACK-VALVE WITH STEEL PINION, FOR GENERAL USE.



UNDERGROUND SCREW-VALVE FOR SHALLOW STREET-MAINS.



ORDINARY RACK AND PINION VALVE.

MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.,

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

LONDON OFFICES. 47, CANNON STREET—JAMES E. & SAMUEL SPENCER, AGENTS.

HANNA, DONALD, & WILSON,

(ESTABLISHED 1851,)

GAS ENGINEERS & CONTRACTORS

FOR THE

ERECTION OF GAS AND WATER WORKS,

TELESCOPIC AND SINGLE-LIFT GASHOLDERS,

CAST AND WROUGHT IRON GASHOLDER-TANKS,

IMPROVED FIXED OR TRAVELLING HYDRAULIC PURIFIER-COVER LIFTERS,

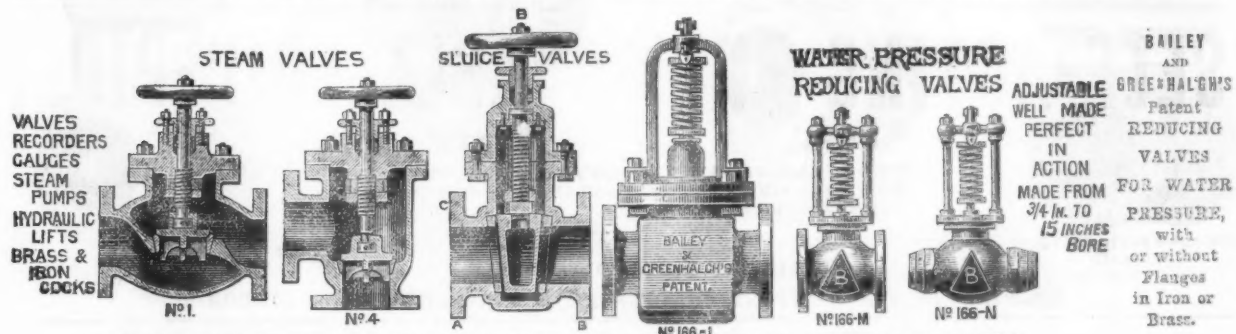
PURIFIERS, CONDENSERS, SCRUBBERS, EXHAUSTERS, AND PUMPING-ENGINES,

TAR AND LIQUOR PUMPS, HYDRAULIC SLUICE AND SLIDE VALVES, LAMP-POSTS AND HYDRANTS COMBINED

DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

London Office: 9, FENCHURCH STREET, E.C.

ABERCORN FOUNDRY & ABBEY WORKS, PAISLEY, N.B.



WE KEEP A LARGE STOCK OF VALVES READY FOR IMMEDIATE DELIVERY.

W. H. BAILEY & CO., Valve and Cock Makers, General Brass Founders for Gas and Water Works, ALBION WORKS, SALFORD, MANCHESTER.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER AND BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM (Established 1765),

MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST-IRON TANKS FOR DITTO.

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS.

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

AND ALL KINDS OF WROUGHT-IRON WORK.

Drawings, Specifications, and Estimates supplied on application.

GAS PURIFICATION

BY

OXIDE OF IRON.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

JOHN WM. O'NEILL, Managing Director.

GAS *v.* ELECTRIC LIGHT.

WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,

For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

SOLE MANUFACTURERS:

J. EDMUNDSON & CO., Gas Engineers, 19, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

MECHANICAL CONDENSATION.

The undersigned has arranged with Messrs. Pelouze and Audouin the exclusive agency for their patented system of Condensation, in Great Britain and the Colonies.

The following are some of the advantages which this philosophic mode of arresting liquefiable vapours possesses:—

1. It acts irrespective of temperature.
2. It requires no motive power, but automatically adapts itself to production.
3. It may be fixed directly after the hydraulic main, by which prolonged contact of the gas with tar is avoided, and the highest standard of illuminating power is obtained which the coal is capable of giving; or it may be fixed directly after an ordinary air condenser, when it will arrest the vapoury globules which cooling alone will not stop, and the production of tar and ammonia water is thereby increased.
4. It effects a considerable saving in purification, through no tar getting to the material to clog its action.
5. It entirely supersedes the necessity of scrubbers; and if wet sawdust be used in a purifier, washers also are unnecessary.
6. It occupies but little space, and avoids that which is now considered a disadvantage—the too much cooling, scrubbing, and washing of gas.

Further particulars may be obtained of

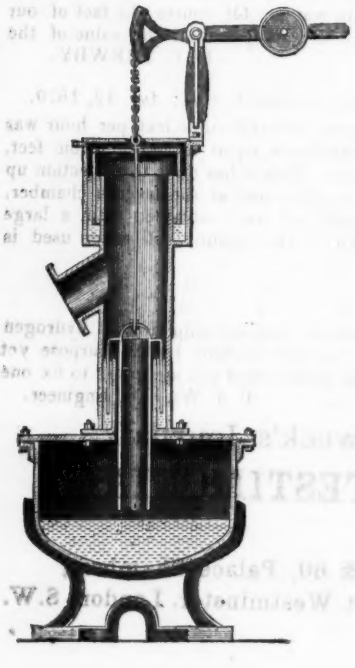
GEO. BOWER, St. Neots, Hunts.

NOTE.—*Gas-works contracted for complete, or apparatus supplied in detail from the retort to the burner. "The Gas and Water Engineer's Book of Reference," post free, 5s. "Handy Abstract of the Public Health Act, 1875," post free, 1s.*

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



The following Testimonials, as to five years constant working of this Patent Removable Dip, have been received:—

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Jan. 15, 1874.

MESSRS. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiries, I beg to inform you that since I have used your Patented Dips (ten in number), I find my make has increased over 1000 cubic feet per ton of coal carbonized, my usual make being 9070 cubic feet before using your Dips, and 10,150 cubic feet since using them.

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Dec. 30, 1879.

MESSRS. CHANDLER and SONS.

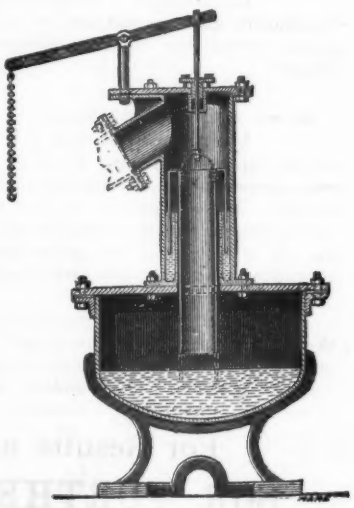
DEAR SIRS,

In reply to your inquiry, it is with very much pleasure thatI endorse every word of my letter of Jan. 15, 1874; and I may add that from the date the Patent Dips were fitted, they have worked perfectly, and there is very little carbon deposited in the retorts, in consequence of the lower pressure.

Yours faithfully,

(Signed) W. CRICKMAY,

Memb. Soc. Engineers.



APPLICATIONS TO BE MADE TO

Messrs. CHANDLER & SONS,

104, NEWINGTON CAUSEWAY, S.E.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER,

FOR

GAS PURIFICATION,

TAKES OUT EVERY TRACE OF AMMONIA AND A LARGE QUANTITY OF CARBONIC ACID AND SULPHURETTED HYDROGEN BY ONCE PASSING THROUGH THE MACHINE.

AMMONIACAL LIQUOR OBTAINED OF ANY REQUIRED STRENGTH.

The Cost of the Machine defrayed by the Ammonia obtained in Twelve Months.

It requires very little attention, and cannot get out of order.

These Machines, which contain from 3200 feet to 65,000 feet of Wetted Surface, are supplied to the following Gas-Works:—

	Feet per Day.
The Gaslight Company, London—	
Beckton	5,000,000
Bromley	7,000,000
St. Pancras	3,000,000
Bradford Corporation	1,000,000
Bremen	150,000
Buxton Local Board	250,000
Dukinfield Local Board	500,000
Driffield Company	100,000
Goole Company	250,000
Glossop Company	300,000
Holywood Company	125,000
Heywood Local Board	600,000
Leeds Corporation	2,000,000
Leominster Company	150,000
Maidstone Company	1,000,000
Phœnix Company, Greenwich	2,500,000
„ „ Vauxhall	3,000,000
Woolwich Equitable Company	400,000
Yeadon Company	500,000

And many in course of Construction, among others—

Feet per Day each.	For	Feet per Day each.	For
Four for 3,000,000	Corporation of Leeds.	One for 1,000,000	West Bromwich Improvement [Commissioners.
Three „ 1,750,000	Corporation of Salford. [Station.		
One „ 2,500,000	The Gaslight Co., Shoreditch	One „ 750,000	Radcliffe and Pilkington Gas Co.
Two „ 1,250,000	The Gaslight Company, Beckton.	One „ 500,000	Oldbury Local Board.
One „ 3,000,000	London Gas Co., Nine Elms.	One „ 150,000	Falmouth Gas Company.
One „ 1,250,000	Corporation of Nottingham.	One „ 250,000	European Gas Company, Rouen.
One „ 2,000,000	Cheltenham Gas Company.	One „ 200,000	Deal Gas Company.

TESTIMONIALS.

Messrs. KIRKHAM and HERSEY. *The Gaslight and Coke Company, Beckton, North Woolwich, June* 8, 1880.

Gentlemen,—I enclose you some particulars of the working of your Washers here, and I intend having some more experiments made, as just now we are working the first Washer with liquor, and the second with water. Of course the fact of our having ordered two more in addition to the four which we have in use is a sufficient indication of my opinion of the value of the Washer.

(Signed) G. C. TREWBY.

Messrs. KIRKHAM and HERSEY. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Aug.* 12, 1879.

Gentlemen,—In reply to your inquiry, one of your Patent Scrubber-Washers to purify 100,000 cubic feet per hour was put into operation at these works on the 1st of June. At the same moment the whole of our Scrubbers, equal to 28,000 cubic feet, were thrown out of use, leaving your Washer the whole work of freeing the gas from Ammonia. This it has done to perfection up to date. With 10 gallons of water to each ton of coal carbonized passing through it we get a clean test at the seventh chamber, leaving four chambers margin for extra work. The mean quantity of Ammonia in the inlet (fixed and free), obtained from a large number of tests, was 241 grains per 100 feet of gas. On the outlet—Free Ammonia—Nil. The quantity of water used is 10 gallons per ton of coal carbonized. The strength of liquor as follows:—

Chamber No.	1	2	3	4	5	6	7	8	9	10	11
Strength of liquor—ounces	Nil.	Nil.	Nil.	Nil.	0·4	1·0	2·2	3·5	5·5	8·25	12·5

We are working five revolutions per minute. It takes out all the free Ammonia, reduces the carbonic acid and sulphuretted hydrogen 30 per cent., requires a very small amount of power to drive, and altogether is, in my opinion, the best machine for the purpose yet invented, and will, I feel confident, ere long, entirely supersede the Scrubbers of to-day. I am glad to find you are going to fix one of these Washers at our Vauxhall works.

(Signed) P. J. WATES, Engineer.

For Results and other Testimonials, see next week's Journal.

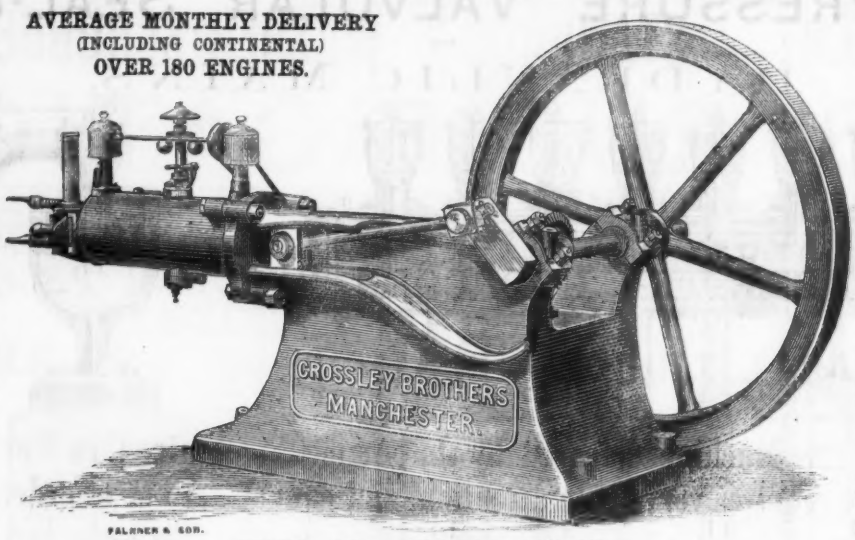
FOR FURTHER PARTICULARS AND TESTIMONIALS, ADDRESS MESSRS.

KIRKHAM, HULETT, & CHANDLER, LIMITED, { 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

AN ENGINE WHICH WORKS WITHOUT A BOILER OR STEAM

These Engines are used at the following Gas-Works:—Birmingham, Brentford, Bucharest, Bishop Stortford, Driffield, Dundalk, Dundee, Dublin, Huddersfield, Hinckley. London—London Gas-Works, Phœnix Gas Co., Gaslight and Coke Co., South Metropolitan Gas Co., Commercial Gas Co., Crystal Palace District, Leominster, Edinburgh and Leith, Ludlow Union, Lancaster, Maidstone, Nuneaton, Northampton,

AVERAGE MONTHLY DELIVERY
(INCLUDING CONTINENTAL)
OVER 180 ENGINES.



Shanghai, Sheffield, Worcester, Wantage, &c.

Over 2500 already delivered.

Very numerous Testimonials from Users, including Engineers, Men of Science, and others, on application to the makers.

No trouble with Coal, Ashes, Smoke, Insurance, Water, or constant attendance.

No Glands to pack, or Water Gauges and Steam Gauges to watch.

STARTS AT A MOMENT'S NOTICE.

THE "OTTO" SILENT GAS-ENGINE,

From ½ to 40 Horse Power Indicated.

(Otto and Crossley's Patents, 1876 and 1877.)

THEY ARE USED FOR ALL KINDS OF PURPOSES, CHIEFLY FOR EXHAUSTERS, SCRUBBERS, & PUMPS.

DELIVERED IN MANCHESTER. CASES NOT CHARGED IF RETURNED FREE.

PRICES INCLUDE CAST-IRON STAND, TURNED FLY-WHEEL, AND DRIVING PULLEY; WATER-VESSEL, SEVERAL DUPLICATES, AND GAS-FITTINGS (EXCEPTING METER AND PIPES).

WORKS AND HEAD OFFICES:
Gt. Marlbro' St., Gloster St.

CROSSLEY BROTHERS,

MANCHESTER.

LONDON HOUSE:
116, Queen Victoria St., E.C.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES
OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

PARIS EXHIBITION, 1878.

THREE MEDALS

AND

HONOURABLE MENTION

HAVE BEEN AWARDED TO

JOSEPH CLIFF & SONS

For their Various Exhibits, amongst which is a

SILVER MEDAL

FOR THEIR

PATENT MACHINE-MADE

RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this class.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

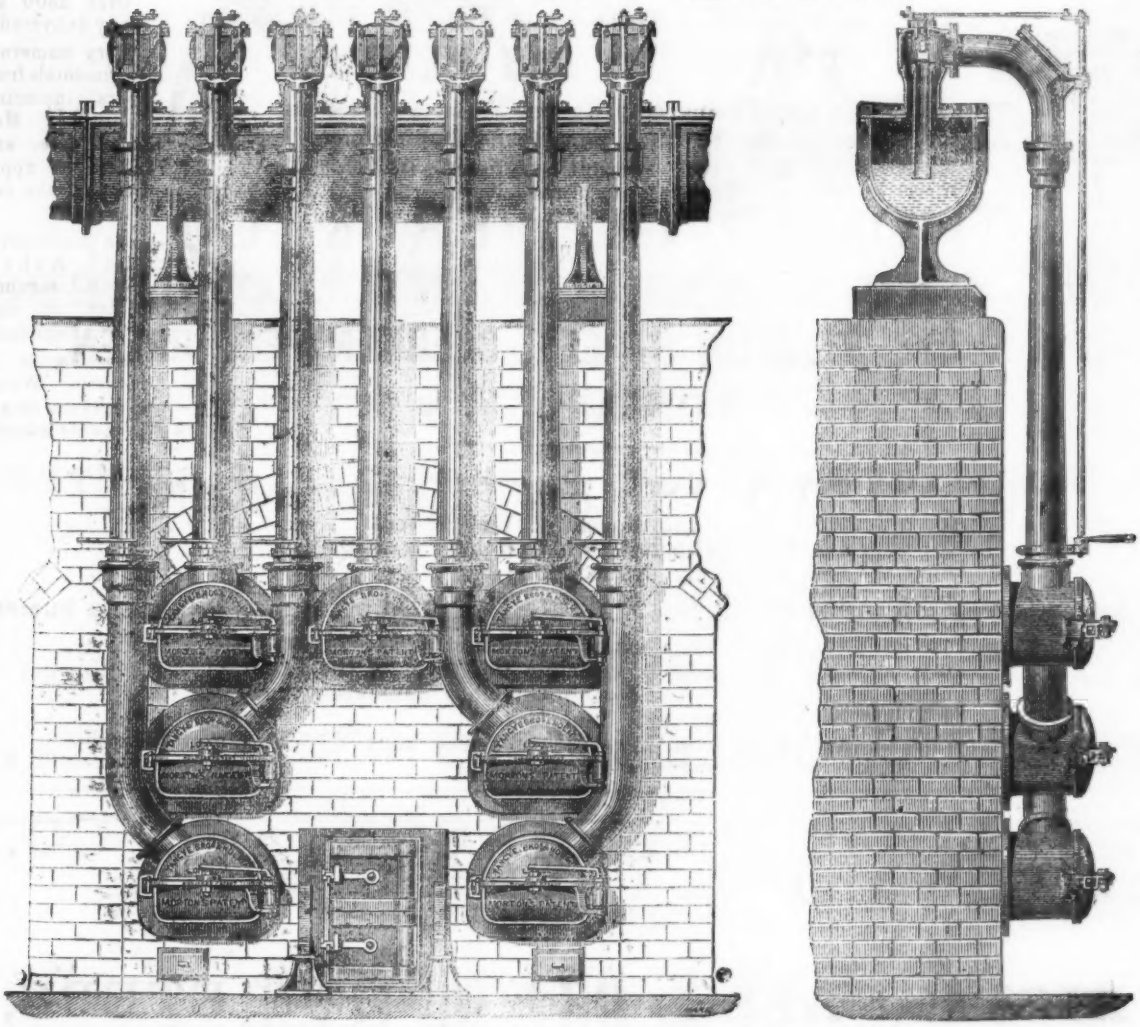
WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4 inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

HOLMAN'S PATENT
NON-PRESSURE VALVULAR SEAL-PIPES
FOR
HYDRAULIC MAINS.



The salient features of the above arrangement are as follows:—

1. The Seal is instantaneously opened and closed from the stage by the stokers.
2. There are only two positions for the actuating lever: one when the Seal is opened during the period of carbonization, the other when it is closed for drawing and charging the retort.
3. The retort can never be blocked, beause the port directing the gas *through* the Seal is always opened, and the port permitting the gas to *pass* the Seal *direct* into the hydraulic main is also open while the retort is at work.
4. The manager and stokers can always see at a glance, by the position of the lever, whether the retort is duly unsealed while carbonizing its charge.
5. There are no extraneous seals, stuffing-boxes, hinges, screws, chains, pulleys, springs, teeth, or other complication belonging to the valves; they are made plain and strong for rough use, and will last many years without renewal.
6. The valve faces are always covered and never separated, hence no foreign matter can put them out of action.
7. They are positive, reliable, interchangeable, free from all the uncertainty of automatic arrangements, and low in price.
8. No extra pipes or connections are required, because the Valvular Seal-pipe is self-contained in the single branch of the ascension-pipe, which stands on the hydraulic main, and is easily accessible by removing an ordinary cover secured by two bolts only.

(238) TWO HUNDRED AND THIRTY-EIGHT HOLMAN'S PATENT VALVULAR SEAL-PIPES are being fitted to the Hydraulic Mains at the Radford Station of the Corporation Gas-Works at Nottingham.

(84) EIGHTY-FOUR more are being fitted to the Mains in the New Retort-House of the Gas-Works at Brentford, and they can be readily applied to existing Hydraulic Mains generally.

They are to be fitted to the Hydraulic Mains of the New Retort-House at the LONDON GAS-WORKS, and at other large stations.

Mr. MORTON writes in the following terms, under date of Feb. 3, 1880:—

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London, 1851 New York, 1853. Paris, 1855. London, 1862.

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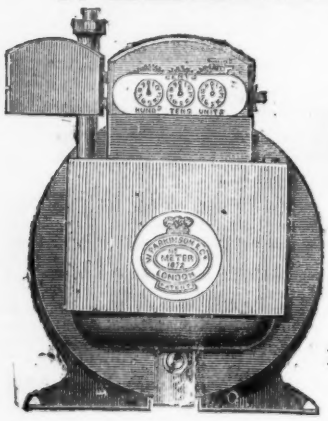

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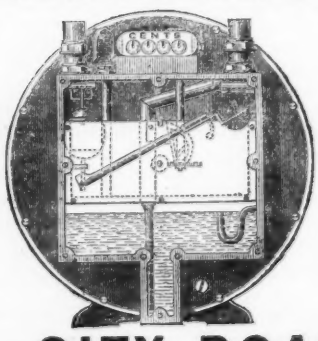

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CONTENTS.

	Page
Circular to Gas Companies:—	
Responsibility of Gas Companies for Damages Caused by Escapes of Gas from their Mains	9
The Corporation of Hanley and the Bill of the British Gaslight Company	10
Dispute between the Dublin Corporation and the Alliance Gas Company as to Road Repairs	10
The Charges for Meters and Gas-Stoves at Leicester	11
Severance of the West Bromwich Gas Supply from Birmingham	11
The Position of the Hawick Gas Company	11
The Effect of Loose Diction in Gas Acts	11
Water and Sanitary Notes:—	
The Select Committee on the London Water Supply	12
The City Authorities and the Charge for Water	12
The Metropolitan Board and their Expenditure in Connection with the Water Inquiry	12
Semi-Official Inspection of the Chelsea Water-Works	12
The Liverpool Corporation Water Bill Passed	13
Correspondence:—	
The Effect of the Contact of Tar and Gas	13
The Scientific Use of Coal Gas	13
Barker's Central System of Gasholders	14
Parliamentary Intelligence:—	
Progress of Bills in the House of Lords	14
Progress of Bills in the House of Commons	14
Rathmines and Rathgar Township Water Bill	14
The Lighting of the House	15
Liverpool Corporation Water Bill	15
House of Lords Committee—British Gaslight Company, Limited (Staffordshire Potteries), Bill	15
Legal Intelligence:—	
High Court of Justice—Chancery Division—Isle of Thanet Gas Company *v.* Davis—Davis *v.* Isle of Thanet Gas Company	22
Miscellaneous News:—	
Illness of Mr. F. J. Evans	11
Accident to Mr. John Storer	11
Lanark and Blantyre Water Supply	11
Society of Engineers	11
Nottingham Sewage Farm	13
The Consumption of Water in Cities	13
Metropolis Gas Supply	23
The Nottingham Corporation Gas-Works	23
Visit to the Chelsea Water Company's Works	24
The Use of "Iron Sponge" for the Purification of Gas	25
Trade Reports	26
Pittenweem Gas Company	27
Gas Companies and their Residuals	27
Register of Patents:—	
Applications for Letters Patent	27
Patents which have passed the Great Seal	27
Patents which have become void	27

TO CORRESPONDENTS.

A Country Manager.—*The manufacturer is acting quite legally. There is no Act of Parliament under which you can take proceedings against him, unless he opens a road or street to lay pipes. Then he can be indicted for nuisance at common law.*

W. L.—*Shall be glad to know what led to the writing of the letter you sent last week. A simple denial of the correctness of a statement published so long ago, is hardly satisfactory, without some explanation.*

F. W. Hartley; Lewis T. Wright.—*Owing to pressure on our space today, your letters were obliged, at the last minute, to be held over till next week.*

TO SUBSCRIBERS.

An Index and Title-Page to the First Half-Yearly Volume of the Journal for 1880 are furnished with this number, and cloth cases for binding may be obtained on order from any bookseller, or from the office; price 2s. 6d. each.

Subscribers who desire to avail themselves of the reduction in the subscription to the Journal by paying in advance for the second half of the year 1880, are reminded that this can only be done during the present month.

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THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 6, 1880.

Circular to Gas Companies.

The case of *Johnson and others v. The Gaslight and Coke Company*, a full report of which appeared in a recent issue of the Journal, has done something towards determining a point on which there has hitherto been much division of opinion. The facts of the case were simple, and upon those of importance there was little conflict of testimony. The Gas Company, fourteen years ago, laid a main-pipe along a road where they had been called upon to supply gas. At that time it is proved that the road was in good condition for receiving the pipes, the earth being in its maiden state, sound and unbroken. Two years later a main sewer was carried through the road, and the houses connected with it by branch drains in the ordinary way. It was stated by the prosecution, but not proved in evidence, that the road had subsided because of the drainage works, and it was argued that this settlement should have been sufficient to suggest the idea of danger to the Company, and cause them to keep a specially watchful eye upon their pipes. It was not, however, till twelve years after the road had been disturbed by the constructing of the sewer that the gas-main was actually fractured. On a December morning the occupants of one of the houses in the road were by some providential circumstance awakened before their usual hour. They found the house charged with gas, and before they could reach the door one of their number became insensible, and all suffered from nausea and the usual effects of partial suffocation from inhaling gas. Fortunately, there appears to have been no light or fire left burning in the house, or the effects upon the inhabitants would probably have been very much more serious than the slight discomfort and loss which were proved at the trial.

Upon opening up the road outside the house, it was found that the main was broken through, and that the gas had made its way along the outside of a disused service-pipe which had supplied a former tenant with gas, and so gained entrance into the house, and caused the annoyance. The breakage of the pipe had not occurred at the point where the service-pipe had been connected, and which was then plugged up, but at some little distance from it, and immediately over the trench in which the house drain had been laid. This trench was found to be still in a loose and unsound condition, while on either side of it the ground was firm as in the rest of the road. The Gas Company contended that the cutting away of the solid earth under their pipe and the inefficient filling in of the trench had not been done by their servants; that they had no notice when the branch drain was laid; and that, consequently, they should not be held liable for the results of such faulty work, over which they had not been able to exercise any control. The Judge (Lord Coleridge) took this view, and summed up the case strongly in favour of the Company. He failed to see any act or omission whatsoever on their part which could be called an act of negligence, and ridiculed the idea of Gas Companies being under an obligation to open down upon their mains for the mere purpose of satisfying themselves that all was right, unless there was some reason to suppose the contrary. The Jury promptly returned their verdict in accordance with the Judge's ruling, and so this really important case, carefully argued out apparently on both sides, was decided in favour of the Company, and will serve as a precedent for the future, barring the way, we do not doubt, to many similarly adventurous actions which would otherwise be taken.

It remains to us now, guided by the case we have thus briefly noticed, to remark upon the general question of the liabilities attaching to Gas Companies in regard to the breaking of their mains or the escape of gas from them. It is satisfactory to know that in the case of an explosion or other damage caused by an escape of gas from a street-main, it is not only necessary to prove the escape, but also that it was due to some cause which reasonable care and foresight could have prevented, before damages can be obtained. It is also eminently useful to have so clear a ruling that the onus of proof in such cases rests solely with the plaintiff. Lord Coleridge says: "In a case like the present, the onus lay on "the plaintiff, who must show some act of negligence; he "must put his finger on some act done wrongfully, or "wrongfully omitted to be done, on the part of the defen-"dants; and if he did not do that he did not discharge the "burden which the law cast upon him, and he must fail." This obligation may possibly press hardly upon the sufferers in some particular case, but it is clearly just as a rule. Were it otherwise, the mere presence of the escaped gas in a house would be *primâ facie* evidence of the responsibility of the Company supplying the district, and evidence on the part of the Company would be liable to be received with suspicion as an effort to evade a just burden.

The case we are considering is thus far satisfactory. It is impossible, however, to look into the question at all without feeling how grave are yet the responsibilities, even when fairly and equitably judged, which rest upon Gas Companies. How wide or how narrow an interpretation may be put upon the phrase "reasonable care and foresight," and what an immense difference there may be in the minds of two jurymen as to what amount of intelligence might properly be ascribed to the typical "reasonable man," with whose behaviour that of ordinary workmen and officers is to be compared. But apart from this, it is part of the almost daily experience of Companies supplying large towns, that trenches are opened alongside their pipes, and to a greater depth, or even that the ground is taken away entirely from about them, and they—the pipes—slung to the timbering of the trench, until the sewerage or other works are completed. In such cases it is the practice, as it is clearly the duty of gas managers, to watch the works in progress, and the filling-in of the trench; but no watchfulness and no attention to the ramming of the trench can make it as solid as the neighbouring earth, or prevent

the subsequent settling of it. Especially in clayey soil it is better, if possible, to remove the main to a solid part of the road, even if the expense of removal has to be borne by the Company. We had occasion to notice a case recently, where a sewer had been laid down under the line of a gas-main. The settlement of the trench was fairly uniform, and the main itself did not break. The service-pipes, however, along the line of the main were repeatedly severed from it, and considerable quantities of gas escaped. In this case the contractor for the sewerage works recouped the Company for the expense of repairs, and acknowledged his liability for the value of the lost gas; but it would have been better for both parties if the main had been removed before the sewer excavation began. We are of opinion that enough is not done by Gas Companies generally to fix the responsibility for damage of this description upon the parties doing the work. There is even an excess of amiability governing the action of the Companies towards the Road Authorities. This is a matter of little moment, perhaps, so far as it relates simply to the damage and loss at the time; but in view of such contingencies as we are now considering it is of great importance. It is clearly just that if a man is injured in person or property by an escape of gas due to causes that might have been avoided, he should be entitled to compensation, and that his natural claim is against the Gas Company. If the Company have, without remonstrance, attended to, possibly repaired or relaid the main which has been damaged, they have accepted the responsibility for what may happen. If, on the other hand, they require the local authority or their contractor to make good defects caused by their work, there would be little or no difficulty in bringing home a liability to them for an accident which might happen even years after. The verdict in favour of the Chartered Company was given on the ground that they did not know of the works being done which caused the breakage of their main, and there was no evidence, in the condition of the road itself, to lead them to suspect danger. The Judge said: "If they "[the Company] had known beforehand what was going "to happen, and if by some known mode of operation they "could have prevented the possible sinking of their pipe, "there would have been reasonable evidence of negligence to "be left to the jury." Now, in the great majority of cases it would be impossible for the Company to plead ignorance of the work being done, and the onus is clearly on them to preserve their pipes intact, either by their own act, or by insisting on due care on the part of those causing the danger.

Mr. G. W. Stevenson drew attention to one aspect of the question well deserving attention. He had ascertained the fact that the cross drain which in Johnson's case caused the mischief, was laid partly by tunnelling; and he pointed out how difficult it is to replace substantially the earth so removed—a difficulty which is the more important because supervision is almost impossible. Tunnelling is often carried on sufficiently near the surface of a road to affect the pipes laid in it, and yet, as Mr. Stevenson remarked, the subsidence might not be observed, because the hard crust of macadam or other covering remained intact. In such cases, when a fracture does take place, the difficulty of discovering and repairing it is increased largely by the distance to which the gas may travel through the loose earth before it finds vent, and special watchfulness should be used by the Company's officials to save or remove their pipes from danger.

It is fortunate that this action was brought against a Company who were not afraid to fight it out. What we want is not mere triumphs in the Law Courts, but settlements as clear as may be of what are the responsibilities and what the rights of Gas Companies; and from this point of view compromises and settlements out of court are much to be deprecated. With the knowledge we have from experience of the tendency an average jury has, in claims for damages, to decide, if possible, adversely to a public Company, we do not wonder that many small and comparatively poor ones prefer to pay rather than fight. So long as there is so little unity of action this will remain an evil to deplore, but still an evil that will last. We have repeatedly urged the necessity for combination on the part of Gas Companies to watch and defend their interests, whether in Parliament or the Law Courts, where they may be assailed. Large and wealthy Companies should be willing to give their help to the smaller ones in such an effort, and the latter should willingly contribute to a fund that, in case of necessity, would give them all the advantages attaching to their more powerful neighbours. The Gas and Water Companies Association was formed for this exact purpose; it has had many opportunities of proving how excellently it can do the work required; its members know how valuable is the guidance and advice which it is prepared to render in case of necessity; and yet it has, we believe, recorded upon its books only a very small proportion of the Companies for whose advantage it was formed. The Companies who stand aloof, either in ignorance or indifference, are themselves the losers; but they do also, by their abstention, weaken the Association and the power of service which it would otherwise possess.

The resemblance may not be at first sight apparent between the Corporation of Hanley and the late British Army which fought in the Peninsula. It is clear, however, that in their inability to recognize when they are beaten there is a striking likeness. The perseverance of the Corporation is worthy of a *good* cause, if not of a better than that they are pursuing. They opposed some years ago an application of the British Gas Company for amended powers, and were defeated; they afterwards applied for a Bill to give them compulsory powers to purchase the Company's undertaking, and their application was rejected; we publish in this week's issue a report of the opposition raised before a Committee of the House of Lords this session to the authorizing of further capital by the Company to be expended in Hanley, from which it will be seen that the Corporation were again unfortunate. Notwithstanding all these failures, the Town Council resolved last week, almost unanimously, to continue their opposition in the Commons, and their determination is evidently strong to persevere in their efforts until they become the happy possessors of the works they have so long desired. Such perseverance is usually in the end successful. In this case the Corporation are, no doubt, prepared to offer liberal terms to the Company, and it may be worth the consideration of the latter whether it is desirable to continue incurring the expense and vexation of this persistent warfare. The Corporation point to the neighbouring towns of the Potteries, where, under the management of the respective Local Authorities, not only do the gas-works pay their way, but yield handsome surpluses for the relief of the rejoicing ratepayers, while the price of gas is not higher than in Hanley. In this case there is no attempt to disguise the truth, that the opposition is being conducted not by, or in the interest of the gas consumers, but of the ratepayers, though apparently the consumers are at least consenting parties. If it is a fact that the British Company have been unable to earn their full dividends out of the Hanley business, this is a very weighty reason in favour of their entertaining the offer to purchase, especially as the limitation of their new capital to a dividend of five per cent. has taken away much of the advantage which used to accrue to a Gas Company in their position, from growth of business and increase of capital. It is certainly a matter of much interest—which was not made clear in the evidence before the Lords—how the Company, failing to earn full dividends, have yet been able to divide them. This will probably be explained in the course of the further progress of the case.

The Corporation of Dublin, or rather so much of that august body as is concerned with the highways and pavements of the city, have betrayed a somewhat narrow spirit in the course of some negotiations which have lately been going on between the Local Authority and the Alliance and Dublin Consumers Gas Company. It seems that the Corporation, being about to dig up the streets for the purpose of paving them, in lieu of macadam, communicated their intention to the Gas Company in the month of November last, with a view to getting new mains and services laid before the paving was proceeded with. The Gas Company replied that, in order to avoid disturbing the new pavement afterwards, they would make a thorough examination of their mains, and lay down new services at all points; would go on with the work during the winter, so that the disturbed soil should have time to settle before the paving was laid; and that all cost of opening and making good the ground, and other expenses, would be borne by the Company, provided that the Corporation would forego their claim for repairing the surface. As the surface referred to was speedily to be done away with entirely, it is hard to see the unfairness of the Company's proposals. On the contrary, their willingness to incur the expense of new services and other renewals, in order to spare the Corporation and the public the annoyance of seeing a new pavement broken up unnecessarily, certainly merited better acknowledgment than it received. However, it will not surprise any one accustomed to observe the ways of corporate bodies when they see their way to a "deal," to find that this reply of the Gas Company led to a vast amount of negotiation and correspondence, resulting in the passing of a resolution by the Committee, to the effect that the Gas Company should pay half the cost of repairing the surface. This resolution was not agreed to by the Company, who decided,

in default of worthier co-operation on the part of the Committee, to let matters go on as they were. Upon this the just and wise Committee threatened to raise their charge for repairing the street openings made by the Company, to which proceeding the Gas Company again objected. The end of the squabble is that the Company have waited until the streets were opened for paving to do what they wanted to their pipes, much to the annoyance of the Corporation, who are doubtless aggrieved at having failed to obtain payment for work which they did not intend to perform.

Some question appears to have arisen at Leicester respecting the different rates charged by the Gas Committee for the hire of gas stoves and meters. A stove valued at £3 is let on hire for 6s. a year, while a meter costing less than £4 brings in 20s. a year rental. This discrepancy was explained, to some extent, by the Chairman of the Gas Committee at a recent meeting of the Town Council, with reference to the different uses to which stoves and meters are put, the one being distinctly instrumental in increasing the consumption of gas, while the other is merely a registering apparatus. With more reason it was shown that the cost of repairs and connections to stoves were borne by the consumers, while meters were repaired and fixed at the cost of the Corporation. This is all very well so far as it goes, but it does not justify such a marked distinction in the rates of hire of the two classes of apparatus. It is not fair to consumers or producers to charge too much or too little for the use of necessary appliances—meters or anything else. Meter-rents ought never to form a too conspicuous source of income in any locality, whether the opportunity of contrasting their cost with that of stoves exists in the same place or not. As long as the meter-rents return a fair margin over the cost of repairs, &c., their owners should in all cases be satisfied, as their customers will always be better pleased to pay for gas than for the use of appliances for using or measuring it.

West Bromwich, the first of the South Staffordshire districts which has separated its gas interests from that of Birmingham, has now entered upon an independent existence. Punctually at 6 a.m. on the 1st instant the gas was cut off from the supply-main of the Birmingham Corporation works, and later in the day the Chairman of the West Bromwich Commissioners, having paid over to the Birmingham Gas Committee a handsome cheque for £70,750, by way of quittance, turned on the main valve from the new works, and declared the undertaking formally open for the supply of gas to the town. The occasion was one of considerable local rejoicing as the celebration of the last act of a drama which has been played out during the past few years, pleasingly diversified with stirring combats in Parliament and the Law Courts, and carried on with considerable expenditure of cash. The West Bromwich people, however, seem to think "the game" has been well "worth the candle," and with much reason. Now that they can supply themselves, it is to be hoped they will be able to please themselves, by maintaining their gas of as good quality as that which they have had hitherto, and possibly at a cheaper rate.

The administration of the Hawick Gas Company's affairs is somewhat noteworthy. Without legislative enactment, by certain provisions in their contract of co-partnership, they devote their profits, after meeting capital charges and providing for a depreciation-fund, to reducing the selling price of gas; and the consequence of this arrangement, as exemplified in the last year's working of the Company, is that their gas, of 29 to 30 candle power, is now selling at 3s. 6½d. per thousand feet. Hence it will be seen that the Hawick gas consumers could not possibly gain anything by the undertaking being transferred to a Local Board, or whatever may be its Scotch equivalent in their case. It should be remarked that the full dividends have been paid for the past year, although the price of gas was reduced fivepence per thousand feet, thus showing the elasticity of gas revenues even in small places.

The Master of the Rolls had a fine opportunity of demonstrating the importance of the study of words, in connection with the cross actions of *The Isle of Thanet Gas Company v. Davis* and *Davis v. The Isle of Thanet Gas Company*, which came before him on the 29th ult. The point at issue was the meaning to be attached to the word "adjacent" occurring in the preamble of the above-named Company's Act of Parliament. The Company, relying on their Act, had laid pipes along the public highway which passes through Mr. Davis's land at a point about 2½ miles, as the crow flies, from the Margate boundary, up to which their rights were undisputed. But although they have a right to lay pipes in Margate and parts adjacent, it was contended, on the part of Mr. Davis, that the said point was not adjacent, as it was nearly three miles away, and he therefore sought to have the Company restrained from laying pipes through his property. In the course of the argument, there was a great searching of dictionaries; and learned disquisitions on philology, that would have delighted the soul of Archbishop Trench, were delivered from bar and bench. Finally, with sole reference to the case in point, without desiring to settle the general meaning of the word, the Master of the Rolls decided against the Company, so that three miles, or a trifle under, cannot be considered henceforth as "adjacent," whenever the neighbourhood of Margate is mentioned, whatever it may be in other localities. In fact, Mr. Chitty, Q.C., produced an American dictionary to show that "adjacent" did not mean the same thing across the Atlantic as it does in England, but Sir George Jessel was not to be caught in this way. He perhaps thought that in a land where everything is on such a large scale, three miles is of no more account than "over the way," or "round the corner," or other such familiar English equivalents for "parts adjacent" in our own small island. The moral of all this is that parliamentary boundaries should always be clearly mapped out, as indeed is generally the case with modern Acts; but there are many Gas Companies working under the protection of Acts as vague as that in point, which, as it now appears, may be read only in accordance with the dictionary commonly used by one of Her Majesty's Judges.

Illness of Mr. F. J. Evans.—Our readers generally will share the sincere sorrow with which we record the serious illness of Mr. F. J. Evans. On one of the hot days of last week, we are informed that Mr. Evans had been engaged for some hours in his laboratory, at his house near Brentford, only leaving it to prepare for dinner. Shortly after he had entered his dressing-room a fall was heard, and upon going to the room it was found that Mr. Evans had been attacked by paralysis, and was unconscious. He has remained in a very critical condition ever since, and upon inquiry yesterday no improvement was reported. We earnestly hope that next week we may have the happiness of intimating that the present danger is past.

Accident to Mr. John Storer.—It is with much regret—in which we shall be joined by very many of our readers—that we hear of an accident which last Monday befell Mr. John Storer, the Secretary and Manager of the Stafford Corporation Gas Department. In connection with an extension now being made to the retort-house at the Stafford Gas-Works, Mr. Storer was visiting Messrs. Westwood and Wright's iron foundry at Brierley Hill, inspecting some castings, and whilst passing through the works, his right foot was caught between two rails, and he was thrown down, and, falling on another rail, the large bone of the right thigh was broken. Assistance was at once obtained, and Mr. Storer was conveyed to the house of a friend at Dudley, where the swelling was reduced and the bone set the same evening, and he is now progressing favourably.

Lanark and Blantyre Water Supply.—Two Bills confirmatory of Provisional Orders made under the Public Health (Scotland) Act, 1867, are now before Parliament. One relates to the burgh of Lanark, and confers on the Local Authority—that is, the Provost, Magistrates, and Town Council—the power to make every provision for an adequate water supply to the inhabitants of the burgh. It gives them authority to put in force over all the waters, roads, or lands contained in the plan submitted all the powers of the Lands Clauses Consolidation Acts with respect to the purchase of lands other than by agreement. All questions of compensation are to submitted to be the arbitration of Mr. George Cunningham, or, failing him, to Sir James Leslie or Mr. George Robertson; and all works in any way interfering with the property of the Caledonian Railway Company are to be executed to the satisfaction of that Company's Engineer. Similar powers are conferred upon the Parochial Board of Blantyre, in reference to the Lees Burn. The Local Authority is not to abstract water from the burn at times when less than 20 gallons per minute are flowing, and a gauge is to be established for the satisfaction of all persons interested in the supply of water. It is also provided that on the application of 20 persons, who receive the water, for the establishment of sand filters, the Sheriff-Substitute for Hamilton district shall, upon being satisfied as to their necessity, compel the Parochial Board to provide and maintain them.

Society of Engineers.—On Tuesday last the Members and Associates of this Society paid a visit to the South Metropolitan and the Crystal Palace District Gas Companies works, by permission of Mr. G. Livesey and Mr. C. Gandon. At the Old Kent Road works the party were received by the former gentleman, who, with the assistance of Mr. F. Livesey and Mr. Somerville, explained the several operations connected with gas manufacture as each department was in turn visited. The latest novelty at these works—the apparatus for preventing the oscillation caused by the exhauster, which formed the subject of the paper read by Mr. Somerville at the recent meeting of the British Association of Gas Managers, and was given, with illustrations of the apparatus, in the last number of the Journal—was an object of special interest to some of the visitors. The chief feature of attraction was, however, the large concrete gasholder-tank, which has been for some time in course of construction, and is now approaching completion; and the details given by Mr. Livesey respecting this great excavation, and the gigantic holder it is eventually to contain, were listened to with much interest. On the completion of the inspection, the President of the Society (Mr. J. Bernays) thanked Mr. Livesey, on behalf of the members and their friends, for his kindness in giving them an opportunity of looking over his works—an opportunity which Mr. Livesey, in his reply, said would be always readily afforded to any member of the Society whenever he felt disposed to avail himself of it. The party then proceeded to the works of the Crystal Palace District Gas Company at Lower Sydenham, where they passed a couple of hours in accompanying Mr. C. Gandon round his works, which were left soon after five o'clock; the rest of the day being spent at the Crystal Palace, where the members of the Society and their friends dined together.

Water and Sanitary Notes.

WHAT is to be the issue of the investigation now going on before the Select Committee on the London Water Supply is what nobody knows, unless Sir W. Harcourt has something practical to reveal, which appears exceedingly unlikely. Six days have now elapsed, extending over three weeks, and everything is where it was. We are not certain that Mr. E. J. Smith is yet disposed of as a witness, and of course there are others to follow him. Mr. Smith tells the Committee that if a Bill endorsing the provisional agreements "be passed in the course of the year 1880," the Companies will be bound to those agreements. This is a great "if," and the prospect of any Bill dealing with the Metropolitan Water Question being passed in the present session appears eminently unlikely. If any power can put an end to the complication, it is on the side of the Water Companies. If they would offer to go to arbitration, or make some abatement of their terms, it is just possible that an impetus would be given to the parliamentary proceedings, and something practical would be the result. But there are difficulties in the way, for the Home Secretary expressed a doubt, before the inquiry commenced, whether the Companies ought to be purchased at any price. Seeing how keenly he has since disputed the bargain with Mr. Smith, we might infer that Sir W. Harcourt is pre-eminently anxious about price, and would agree to purchase if the terms were materially reduced. If, after all, the question of quality is to be debated, the Counsel for the Companies may have to watch the fray for a long time.

It would certainly be interesting to know what the Home Secretary is "driving at" in this inquiry. He quarrels with the price to be paid for the Companies undertakings, and, so far as he has made his ideas known, he is equally dissatisfied with the quality of the water supplied. Are we to suppose that the present inquiry is simply to have a negative result? Is the issue of it all to be that of getting the public to believe that the Companies have asked too much, and that the Water Supply of the Metropolis is not worth having, even if the price be reduced? Are the Select Committee merely to clear the way for some grand aqueduct scheme, which is to glorify the memory of Sir William Harcourt? As the inquiry goes on, we shall probably get clearer light, but we doubt whether the prospect will be one upon which the public ought to be congratulated.

On Friday last Mr. Smith acquitted himself more deftly before the Committee than on any previous day. Whether the absence of Sir W. Harcourt gave relief to his mind, or whether the questions were such as admitted of more *piquant* answers than could be given to the queries of the Home Secretary, we cannot determine. But it were much to be wished that Mr. Smith had in the first instance been questioned by Counsel in support of the Purchase Bill. Sir W. Harcourt is not favourable to that Bill, and, however impartially he may desire to act, his interrogations are not likely to bring out such good points as the scheme may possess. Mr. Smith defends the provisional agreements as the best that could be made under the circumstances, and he contends that purchase by agreement was the only available course. A compulsory purchase would be costly, and competition was impracticable. Questions were asked of the witness which were obviously suggested by the idea of buying up some of the Companies only. Mr. Smith demurred to such a scheme as contrary to the rules of economy. Everything, in his mind, pointed to the necessity of consolidating the Companies, and an arrangement which left out even one only was fatally imperfect. As for introducing an entirely new Company, this would simply be creating a ninth, which would have to be bought up ultimately along with the eight. In any scheme of competition there was also a doubt whether the public would, in all cases, consent to be served by the new comer. The difficulty of laying down an additional set of mains was itself a serious matter. The evidence of Sir J. Bazalgette in the case of the scheme for bringing sea water from Brighton to London was available for showing that in certain thoroughfares at the West-end there was not space left underground for any more pipes to be laid. If this is the case at the West-end, much less is it likely that extra pipes could be conveniently laid in the more crowded parts of the Metropolis. The explanation is now offered that Sir J. Bazalgette's objection only applied to two particular streets. But we apprehend that his evidence on this point was understood at the time to apply so generally to the sea water scheme as to demonstrate its impracticability.

It is urged as an objection to the quality of the present water supply, that deaths from diarrhœa and simple cholera increase with a rise of temperature in the river. But this indictment is obviously founded on a very narrow view of the circumstances. The rise of the temperature affects the sewers and drains as well as the water supply, and the whole atmosphere is directly influenced. Mr. Smith very properly showed, in his evidence on Friday, that the district of the Kent Company was a far more open and healthy one than that which is occupied by the population dependent on the water supply of the East London Company. Reference being made to the reports of the Rivers Pollution Commissioners condemning the Metropolitan Water Supply, Mr. Smith asked concerning the Commissioners: "Who are they?" Of course, at the utmost, there are but two of these gentlemen, and in respect to the chemical analyses all depends on one of the two. In everything that is said by "the Commissioners" that impugns the character of the supply, we have simply the authority of Dr. Frankland.

A discussion took place at a recent meeting of the Commissioners of Sewers as to whether the Commission should take action separately from the Corporation in respect to the inquiry before the Select Committee on the London Water Supply. Some of the speakers argued that the Commissioners represented the ratepayers of the City, which the Corporation did not. On the other hand, it was remarked that the Commissioners were not the Local Authority on the Metropolitan Water Question. All that concerned them was the quantity of water required for watering the streets and for general sanitary purposes. The Special Committee of the Corporation were acting under instructions, of which the resolutions of the Commissioners formed part, and eight out of the twelve members of the Special Committee were members of the Commission. It was also important there should be no appearance of division. Among those who were desirous of seeing the Commissioners take some separate action in the matter, anxiety was expressed that the Select Committee should be thoroughly enlightened as to the charges made for the supply of water in the City. In debating this part of the question, remarks were made by some of the speakers, which clearly proved that whatever the charges were at present, they were capable of being carried to a much higher pitch. Thus it was not merely the present rates of which complaint was made, but also the much higher ones which were looming in the distance. It was stated by Mr. John Cox that notices were being sent over the City, announcing an increase of rates, and as it was probable that the rateable value of the City would be as much as four millions next year, the prospect was a serious one. These several points having been discussed, it was decided at last to leave the matter where it was, in the hands of the Corporation.

The Metropolitan Board lately proposed taking steps to have a Bill brought into Parliament which, if passed, would enable them to expend money in promoting their views on the Metropolitan Water Question. The idea was to amend the 144th section of the Metropolis Local Management Act, so as to escape all risk of having expenditure on the Water Question disallowed by the Government Auditor. The present Home Secretary appeared to favour the proposal, and asked that a Bill for the purpose should be drafted and submitted to him. This it was resolved should be done. Mr. Jones, of the Strand District, was so gratified with the prospect which thus presented itself, that he withdrew his notice of motion, which was—"That the Parliamentary Committee be instructed not to commit the Board to any line of procedure with respect to the inquiry as to the Metropolitan Water Supply, without giving the Board an opportunity of expressing its opinion thereon." If the proposal to let the Board spend money on the Water Question induced Mr. Jones to withdraw this motion, the logical sequence is not so clear to us as it is to him. That the Board is capable of spending a lot of money on the Water Question, without doing any good, has already been proved; and Mr. Jones may find it necessary to exercise continued vigilance. Concerning the alteration of law, it is now suggested by the Home Office that a clause might be inserted in the Loans Bill of the Board which would effect all that is desired. Before acting on this suggestion, the Board have to consult "my Lords" of the Treasury, who may not, perhaps, altogether approve of the notion, seeing that it tends to diminish the power of the Auditor, with whom they annually terrify the authorities at Spring Gardens.

The Chelsea Water Company have shown their readiness to let in the light on their proceedings by inviting various authorities to an inspection of their works—an event which took place last Saturday week. The invitations were singularly impartial, including Dr. Tidy and Dr. Frankland, as well as Lieut.-Col. F. Bolton, Dr. W. Pole, and Mr. T. Hawksley, with

other notabilities. At the luncheon which followed, sundry speeches were made. One of these was by Dr. Frankland, who put his view of the case very cleverly. "He would not "say a word as to the quality of the Thames water itself;" but he recognized the fact that the Companies had incurred enormous expense in removing their intakes to, "at all events, "a less objectionable part of the river." He also felt compelled to admit that the Companies had of late years done everything that was reasonably within their power to improve the supply. So far this is an answer to those consumers who complain that they are charged a higher price now than formerly, although, as they contend, nothing has been done to improve the quality of the water. On this point, of course, Dr. Frankland had nothing to say; but he finished off with a statement which was tolerably fair. He observed that "it was easy in a laboratory to criticize the "defects of the supply, but it was quite another thing to do "so in practice." The meaning of this, we presume, is that it is an easy thing to find fault, and a difficult thing to attain perfection. Dr. Frankland will doubtless find that there are some people who are even capable of grumbling at the deep-well water that comes out of the chalk.

The Liverpool Water Bill has passed the Select Committee of the House of Commons, to whom it was referred, and a special report has been presented to the House, which has been ordered to be printed. In the discussion of clauses last week, opposition was offered by the Widnes Local Board, who claimed a portion of the supply to be drawn from the Vyrnwy. The Liverpool Corporation were willing to deal with the Widnes Board by agreement, but objected to compulsion. After some discussion, Mr. Pembroke Stephens, who appeared on behalf of the Widnes authorities, said he was quite willing that, if at any time the Liverpool supply proved insufficient to allow thirty gallons per head of the population, in such a case the claim of Widnes should be subject to a preferential right on the part of Liverpool to that extent. The supply taken by Widnes would, of course, be paid for. Ultimately the Committee decided to admit a clause obliging the Liverpool Corporation to supply water to Widnes on the basis thus proposed, the water from the wells to be included in the reckoning of the thirty gallons, so long as such water was approved on sanitary grounds.

THE South Staffordshire Water Company's new works in the neighbourhood of Cannock are to be formally opened on Wednesday, the 21st inst., on which occasion it is expected that representatives of some 18 or 19 of the Local Boards within the Company's area will be present. These large additional works are rendered necessary by the ever-growing requirements of the population supplied by the Company, their district occupying something like 300 square miles, and containing more than half a million people.

NOTTINGHAM SEWAGE FARM.—The works in connection with the Nottingham Corporation Sewage Farm, which have now been in hand some years, and upon which about £150,000 has already been expended, having reached a state bordering upon completion, on Thursday, the 24th ult., the Sewage Farm Committee inspected the works at Stoke Bardolph designed for the utilization and disposal of the sewage of the borough. At this preliminary opening a portion of the sewage farm, which is 640 acres in extent, designed for a population of 180,000, was placed under irrigation, the "carriers" being fully charged when the sluices were opened by the Mayor (Sir James Oldknow) and the Chairman of the Committee (Alderman Barber); subsequent to which the sewage was quickly distributed over the different plots of ground which had been prepared. The farm, however admirably conducted, cannot, it is said, be made to yield an adequate return to the Corporation for their enormous outlay; but the management at all events will, under Mr. Avis, the farm bailiff, leave little to be desired. The Engineer (Mr. M. Ogle Tarbotton) was absent on parliamentary business when the actual work was inaugurated; but has kindly promised to send further particulars at a future date.

THE CONSUMPTION OF WATER IN CITIES.—The *Scientific American* says that, in a discussion in Congress, relative to the water supply of the district of Columbia, the following statement was given of the average daily *per capita* consumption of water in different cities, the figures being from official reports:—

City	Gals.	City	Gals.
Providence, U.S.A.	25	Detroit, U.S.A.	105
Fall River "	26	Chicago "	119
Lowell "	33	Washington "	155
Lynn "	34	New York "	100
Rochester "	35	Albany "	80
Columbus "	43	Jersey City "	99
Lawrence "	44	London, England	29
Milwaukee "	53	Liverpool, "	23
Cambridge "	55	Glasgow, Scotland	50
St. Louis "	56	Edinburgh "	38
Cleveland "	56	Dublin, Ireland.	25
Cincinnati "	57	Paris, France.	28
Philadelphia "	58	Tours "	22
Brooklyn "	63	Toulouse "	26
Boston "	75	Lyons "	20
Buffalo "	87	Leghorn, Italy	30
Montreal, Canada	69	Berlin, Prussia	20
Toronto "	77	Hamburg "	33

MR. R. A. BROWNING, Assistant Manager, under his father, at the Plymouth and Stonehouse Gas Company's works, has been appointed Engineer and Manager of the Neath Corporation Gas-Works, having been selected from 77 applicants for the situation vacated by Mr. C. S. Ellery on his appointment at Bath.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

THE EFFECT OF THE CONTACT OF TAR AND GAS.

SIR,—Under reference to Mr. Greville Williams's lecture, contained in the JOURNAL, June 15 (Vol. XXXV., pp. 948-9), as to the effect of illuminating gas coming into contact with tar, allow me to draw your attention to experiments, the results of which have been stated more than once in your JOURNAL, as to the effect of tar and other hydrocarbons in reducing the illuminating power of gas when they are brought into contact with it.

If you will refer to a paper read by Mr. Young, of Clippens, before the West of Scotland Association of Gas Managers, as contained in your JOURNAL of June 1, 1875 (p. 803), you will find the subject fully discussed. From experiments made by the late Mr. Cusiter, referred to in Mr. Young's paper, and also from experiments made since, it was found—

1. That when gas, after it had passed the purifiers, was presented to the same tar from which it had been separated in the usual way of condensation, and at the same temperature that they left the condensers, the illuminating power of the gas was but little reduced.

2. That when the tar was reduced below the temperature at which it and the gas left the condensers, and they were then brought into contact, the illuminating power was reduced; or if the gas was reduced in temperature, the same rule applied. Also, that the greater the reduction of temperature, in either or both, the greater was the reduction in illuminating power.

3. That rich gas suffered a greater reduction in illuminating power when brought into contact with tars made from poor coals than when brought into contact with those made from rich coals, the gas and tar being cold; and *vice versâ*.

4. That when cold gas was presented to cold once-run tar (that is, tar from which the spirit and light oils had been extracted) the illuminating power was reduced in many cases as much as 50 per cent.

5. That when gas in condensation was presented to the tars maintained at a temperature of about 190°, the tar did not absorb the illuminants. On the contrary, it carried these forward, and the illuminating power of the gas was thereby permanently and greatly increased, as has been shown frequently in your JOURNAL.

6. That when gas, rich or poor, was presented to tars, as they came from condensers of the ordinary description after the tars had been heated to about 190°, the illuminating power of the gas was greatly increased.

In short, if it is desired that the gas should be made of as great illuminating power as it is possible to do from the nature of the coal used, it is necessary that the condensation should be so effected that the tars and gases should not come into contact at a less temperature than about 190°, and it is on these lines that my patent works.

Darroch, near Falkirk, June 25, 1880. HENRY AITKEN.

THE SCIENTIFIC USE OF COAL GAS.

SIR,—In reply to your correspondent, "Alex. M'Ivor," in the JOURNAL of June 22, I beg to inform him and your readers generally that what I mean by a non-actinic light is that kind of light—sufficiently powerful for the purposes of reading, drawing, or working—from which the actinic or chemical ray has been divested or filtered out.

The actinic or chemical ray, as many of your readers know, is that invisible portion of the solar spectrum beyond the violet ray. Thus, in the solar spectrum there is, first in order of velocity of movement, the invisible heat ray; then the red ray, followed by the orange, yellow, green, blue, violet; and, lastly, the invisible actinic or chemical ray, moving with the highest velocity. The last is that part of solar light which decomposes the silver on the prepared photographic plate. It also affects in a similar manner all organic substances, and produces a sense of fatigue in the human eye more rapidly than any of the other rays of which sunlight is composed.

This fact will readily be perceived by any one who will attempt to read a book printed on white paper in the open air on a bright sunny day, unshaded by trees or other suitable screen. The effect produced by this strongly actinic light will inevitably be sleep—a sure sign of fatigue in the visual organs.

Green fields and trees serve as correctives to the actinic ray of strong sunlight, the light reflected from green surfaces being almost devoid of actinism. Hence the difficulty of photographing trees and fields, and it is for this reason that on bright sunny days the view of trees and green fields is so grateful to the sight.

Now, artificial light, being composed in like manner with solar light, is also actinic. The degree of actinism reached by artificial light varies not so much according to the illuminating power of the light, as it does with its intensity. A light of low illuminating power may be highly actinic, and *vice versâ*. Thus a well-made spermaceti or paraffin candle is highly actinic; a large brazier of red-hot coal is of great illuminating power of low intensity, but is not actinic. The image of the candle can be photographed on the wet collodion plate in less than 10 seconds; the image of the brazier of coals can only be photographed at all by such skilful photographers as Captain Abney, R.E., of South Kensington, who has succeeded, by a dexterous manipulation of chemicals, in photographing the red ray. But for all this, the light emitted by the brazier may be equal to more than 1000 candles. The electric light, on the other hand, is highly actinic, and the little intense spark from which the volume of light is produced, will photograph itself in an inappreciable fraction of time.

The actinism of ordinary gaslight varies very much, Argand burners being of less actinic power than flat-flames, and requiring a longer time to photograph themselves than a flat-flame of the same power does. Thus a Wigham burner, of 200-candle power, will produce a photograph in about the same time as a 400-candle power Argand burner surrounded by a chimney.

An artificial light, no matter how it is produced, suitable for reading or drawing, should be nearly non-actinic. This is the kind of light

which one gets in an ordinary well-lighted room into which the sun's rays do not penetrate—a light easy and comfortable to the eyes. A yellowish tint, or even a greenish tint, in the glass renders this light still more agreeable. A candle—as usually made use of, close to the eyes, and rather lower than the level of the sight—is as far as possible removed from this state of things. Its sharp highly-actinic rays are darted into the eye whenever the reader lifts his head; and the diaphragm of the eye is kept in a state of rapid and distressing movement. The light on the paper is too little—6 or 7 minutes would be required to produce a photograph of it—the head is lifted a little, and a ray of light is shot into the eye, which photographs the image of the flame in 7 or 8 seconds. Hence the injury to the sight by the use of candles for reading or studying.

An open gaslight is really not so bad, because it is always used at a height much greater from the head, and unless the reader looks up, in thought, at the light, he does not suffer so much from it. But a light suitable for working with must possess that great property of daylight—perfect steadiness, with uniformity of illuminating power. Any unshaded light, whether gas, or candles, or lamp, cannot fulfil this important condition. Light must fall on the eyes as well as on the paper, or the diaphragm of the eye will be kept in perpetual movement—a state which it cannot long support. Sudden slight variations of illuminating power in the eye are extremely fatiguing and injurious; therefore a flickering light is bad. But the light which falls on the eye should, in my opinion, be red, entirely devoid of actinism. This can be effected by placing round the reflector of the lamp a ruby-coloured glass. Orange or yellow glass will do if the person who is going to use it does not like red. The reflection from a paper lighted by a good Argand burner of 18-candle power fixed at 18 inches from the paper will be such that a photograph of the page of the book could be taken by a wet collodion plate in about 3 minutes. This light will be about equal to that in an ordinary lighted room by daylight. The red ray falling on the eye will protect it from the reflected actinism of the light. Or, for some persons with very weak eyes, a rose-tinted screen may be used, so that the light thrown on the paper may be slightly rose-coloured, in which case the light will be devoid of actinism. With such a light a person with very weak or delicately sensitive sight may read or write in comfort for hours together.

A steady flat-flame burner may be used (notwithstanding it is more actinic than an Argand), if the precaution is taken to surround the light with a ruby glass, or a ruby glass screen is interposed between the light and the page of the book.

I trust I have sufficiently explained what I meant; but if your readers desire any further information on this highly important subject, I am always at their service.

WILLIAM SUGG.

Westminster, June 26, 1880.

BARKER'S CENTRAL SYSTEM OF GASHOLDERS.

SIR,—I am sure my brother ought to be much obliged to you for your very complimentary remarks respecting his paper on "Gasholders," published in your issue of June 22. At the same time I fear he must have felt great disappointment on finding an entire absence of figures and calculations, and very little argument, in your article; but in their stead a string of generalities, questions, and vague doubts. I beg permission, therefore, to offer, in explanation and reply to your doubts, a few figures, &c., which I will make as concise as possible.

I will not follow you by commencing at the *top* of the holder, but, on the contrary, at the foundations; because, if any real doubt exists about the foundations, or the stability of the column, argument on all minor matters would be futile.

1. *Pressure on Foundations.*—The column described in the paper was 120 feet high, 20 feet diameter, 30 feet base, 2000 tons weight. The area of 30 feet is 707 square feet; and 2000 tons divided by 707, is 2·83 tons pressure per square foot—a less weight than that on the foundations of most high warehouses, houses above five storeys high, or upon the foundations of gasholder-tanks, including weight of columns and framing. But were this pressure thought to be too much for soft ground, how easy it would be to increase the base 1 foot all round, which would make the area 100 feet more, and thus materially reduce the pressure per square foot.

2. *Stability or Resistance to Overturning.*—My brother correctly stated that a force of 250 tons was required, applied at the top, to overturn the column he described (though I may just say, in passing, that this is *double* the force it is possible could be brought to bear on your 200 feet holder 100 feet high). This statement has not been challenged, so easy is it to see that it is true. The clearness and simplicity of this (stability) my brother claims as the great advantage of his system.

3. *Strain on Casing of Column.*—You have cast doubt on this point in the following words:—"Would not the iron plates loosen and fail long before the force which would overturn the column could be reached?" A most extraordinary question to ask, seeing how easy it is to ascertain approximately (and not difficult accurately) the thickness of metal required to meet all the strains with certainty. There will be none of the uncertainty which necessarily exists wherever groups of cast-iron columns, braced together, are used. The strength of the central column consists in the wrought-iron casing and upright guides, kept apart so as to act as the flanges of a girder, by the circular joint rings and the rammed ballast or *débris*, and occasional circular discs of solid concrete. Consequently we have to deal with a simple cantilever 20 feet deep and 120 feet long (or 6 to 1), forming a very rigid structure. The plates only require to be of moderate thickness at the very bottom, and would, of course, be made thinner towards the top; the riveting being so arranged as to secure continuity of strength. Having had myself to superintend the construction of large columns of this kind for deep flooded river bridges, I know how well they answer in every way.

4. *Guide Rollers.*—On the subject of guide rollers you remarked: "The force which might at any time have to be transmitted through a very few rollers on Mr. Barker's plan would be *enormous*," &c. I fear you cannot have gone into calculation on this point. For example, take the worst possible case—viz., your 200 feet holder 100 feet high, entirely up. Half a hundredweight of wind on every square foot exposed amounts to 500 tons, but has only the effect of 250 tons, because of the round surface; 125 tons go to the top rollers, and 125 tons to the bottom. Then, taking your own assumption that only half the rollers act, my brother shows eight groups of rollers, three in each group. Now 125 tons divided by 12 gives 10½ tons per roller, or 31½ tons per group of three rollers, under the worst possible conditions. Is 10½ tons an *enormous* pressure to provide for? On the contrary, it is a mere bagatelle, considering the slow movement, as every practical engineer will admit.

5. *Guiding and Adjusting.*—On these points my brother spoke very guardedly, and properly so, because he had had no experience on the subject. But in his system there are the same rollers at the bottom as in the outside system, and he believes that, given a stable central column with efficient guides, he will be able to make such guide rollers and frames *at the top* as will enable adjustment to be effected as easily as at present.

In conclusion, let me say a word on your statement that "he was not followed by a single supporter when his remarks were subsequently discussed." I was not able to hear the paper read, but heard a part of the discussion, and was impressed with the feeling that the speakers were deceived by the disparity in size of the holder (full of wind) and the column (full of solid earth). Nothing is more calculated to deceive the eye, I admit; and it is no disparagement to practical gas managers to say that this subject being almost entirely a civil engineering one, it is therefore not likely to be grasped at once by men who are not experts in construction. But let any one strike out a 20 feet or 30 feet circle on the ground and contemplate it, remembering that its height is only four or five times its width, and then make a small model for himself, and his very natural doubts and prejudices will evaporate, for he will awaken to the fact that he is dealing with a "mountain" rather than a column.

You did not refer to the great economy of money and space, and ease of erection, effected by this system, it being clear, I presume, that these *must* follow its, in other respects, successful adoption.

JOHN BARKER, M. Inst. C.E.

20, *Oppidans Road, Primrose Hill, N.W., June* 27, 1880.

P.S.—Space will not permit, I fear, for me to go into the question of placing the girders of the present outside system "on flat," instead of "on edge," or it would be quite easy to show that the former is far the most economical plan.—J. B.

[In the above letter our correspondent does not give us much fresh information, nor is his style of argument such as to induce us to change our opinion on the subject in question. He spends much energy in proving certain propositions, respecting the construction and stability of large columns, which we have never denied; while he leaves our remarks on the difficulty of adjusting the holder practically unanswered. He is, moreover, in error in stating that we assumed that half the rollers will always be in action; and we certainly cannot admit the truth of his assertion that the pressure transmitted through any "group" of three rollers is necessarily divided equally among all the rollers which compose the "group." Our correspondent, too, is not happy in the conclusions to which he has arrived, as to the causes of his brother's failure to convince his auditory. After the flattering personal reception which Mr. G. Barker received, we scarcely expected to hear that it was only through lack of engineering knowledge on their part that his hearers remained sceptical. We should not, preferably, have introduced this element into the discussion; but as Mr. John Barker has thought fit to do so, we may perhaps be permitted to remark that some of the professional gentlemen present at the meeting, several of whom joined in the discussion referred to, could scarcely be deemed inferior in technical skill and experience to either himself or his brother, or possibly to both together.—ED. J. G. L.]

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JUNE 28.

GAS AND WATER ORDERS CONFIRMATION BILL.—This Bill was read a second time, and committed; the Committee to be proposed by the Committee of Selection, the Holywell Gas Order being opposed by the Holywell Local Board.

LOCAL GOVERNMENT (GAS) PROVISIONAL ORDER BILL.—This Bill passed through Committee.

TUESDAY, JUNE 29.

LOCAL GOVERNMENT (GAS) PROVISIONAL ORDER BILL.—This Bill was read the third time and passed.

THURSDAY, JULY 1.

A petition against the Ackworth, Featherstone, Purston, and Sharlston Gas Bill was presented from George Bradley; and one against the Wigan Improvement Bill, from John Fowden Hodges.

HOUSE OF COMMONS.

MONDAY, JUNE 28.

Petitions against the Rathmines and Rathgar Township Water Bill (Lords) were presented from (1) Corporation of Dublin, (2) Edward Cecil Guinness.

TUESDAY, JUNE 29.

The petition of the Corporation of Oswestry against the Liverpool Corporation Water Bill was withdrawn.

RATHMINES AND RATHGAR TOWNSHIP WATER BILL (LORDS).

Petitions against this Bill were presented from (1) Owners, &c., of mills, (2) Ratepayers and owners, &c., of property in Rathmines and Rathgar and others, (3) Owners, &c., of mills, &c., situate near the River Dodder; Nos. 1 and 2 being against alterations only.

On the order for the second reading of the Bill,

Mr. MAURICE BROOKS moved that it be read a second time that day three months. He said the Rathmines and Rathgar township was a very large and flourishing district in the immediate neighbourhood of the borough of Dublin, and it was desirous of obtaining an independent supply of water, the present supply being confessedly inadequate and impure. This was proposed to be done at a cost of about £100,000, and he (Mr. Brooks) was opposed to the obtaining of these powers, because the city of

Dublin possessed in the Vartry scheme that which was undoubtedly the finest and best public supply of water existing anywhere in the world. The Vartry water supply lay at the very door of the Rathmines and Rathgar township. There were no engineering difficulties, nor any of any other kind that had been pointed out, that should prevent the Rathmines and Rathgar township from participating in the Dublin supply. But there was a fear on the part of the township that if they obtained a supply of water from Dublin the project of amalgamating the Rathmines and Rathgar township and the surrounding townships with the city of Dublin would be facilitated, and that the consequences which would ensue would be very greatly to the advantage of the city of Dublin, but not to that of the township of Rathmines and Rathgar. But he might remind the House that there was at present, and had been for some years, a Commission sitting in Dublin to inquire into the propriety of re-adjusting the relations of the city of Dublin with the surrounding districts. This Commission was about to present its report, and the citizens of Dublin had no doubt it would recommend that all these townships should be amalgamated with the city of Dublin, so that they might avoid the difficulty which prevailed in the City of London, and which prevented the carrying out of the great principle of local self-government. This, as far as he understood it, was the only objection the Rathmines and Rathgar Commissioners had to obtaining their water supply from Dublin. Undoubtedly, if this scheme were carried out, the present inequality in the rating of the boroughs of Rathmines and Dublin would be remedied. Rathmines would undoubtedly have to pay somewhat higher taxes, and Dublin somewhat lower, and the grievance that existed would be discontinued. With regard to the present condition of the water supply in Rathmines, he might mention that the Government supplied the barracks in the midst of the Rathmines and Rathgar township with the Vartry water at a cost of £500 a year. Every penny of this amount would have to be contributed by Dublin, and this would mean raising the Dublin taxes. Then with reference to the rates at which the water should be supplied, there would be no difficulty, because the Corporation of Dublin were willing to leave the rate of payment to be decided by arbitration.

Mr. FINDLATER supported the second reading of the Bill, and thought it was a very unfair proceeding on the part of the honourable member for Dublin to thus interfere with a matter that had already been before the ratepayers, and had been fully discussed by them, with the result that out of 3000 ratepayers, only 19 expressed their dissent from the scheme. He (Mr. Findlater) was a ratepayer in Rathmines, and had every confidence that the Commissioners would do their best for the ratepayers. In 1874 the Dublin Corporation excluded the compulsory right of the Rathmines Commissioners to take water from the Vartry, while at the present time they were asking to rescind that Act. In 1877, also, they entered into negotiations with the Commissioners of Rathmines for the purpose of supplying the township with water, and after the negotiations were concluded they were repudiated by certain members of the Corporation, and the agreement was not carried out. It was quite impossible in the House that they could go into the merits of the question in the satisfactory manner in which it had been dealt with by the Committee of the House of Lords. There was no question of surprise in regard to the Bill, as all the facts brought forward by the honourable member for Dublin had been fully stated before the Lords Committee, and he (Mr. Findlater) considered this to be a most unusual and improper attempt to throw out a Bill.

Mr. RODWELL said he did not propose to go into the merits of the case, but it appeared to him that this was a Bill which had occupied the attention of a Committee of the House of Lords for seven days, when there was another scheme brought forward in opposition to it, which scheme, however, was unsuccessful. He could only remind the House that it was a very unusual course to oppose a Bill upon the second reading under such circumstances as these, and the fact of its having occupied so long a time must, he thought, have satisfied the House that it was a Bill that required some consideration. Such consideration ought to be given to it by a Committee, before the House committed itself to the course of throwing it out. It seemed to him that the fact that the Bill had already been so thoroughly discussed was a reason why it should go to a Select Committee, and should not be disposed of in the summary way suggested by the honourable member for Dublin.

Mr. LITTON also supported the second reading of the Bill. The honourable member for Dublin, he said, seemed to have forgotten that he had had the opportunity of pressing his objections on the House of Lords Committee, and this being the case he (Mr. Litton) considered the course adopted was one that was very inconvenient to the House. Upon the second reading of a Bill—a proceeding that was very much a matter of course—the honourable member, in a short statement of his views, asked the House to undo and to set at naught the labours of the House of Lords, who had had the Bill before them, and had conducted an investigation extending over several days. If this practice were adopted generally, the system of conducting private Bills through the House would become almost intolerable. If the honourable member thought he had a case, let him go before a Committee of the House, and take such steps as would enable the opponents of the measure to state their objections to it.

Lord RANDOLPH CHURCHILL said that having had some acquaintance with the Water Supply of Dublin, he should support the honourable member in his motion for the rejection of the Bill. He had undoubtedly a very strong case, and the very fact that the learned member for Cambridgeshire (Mr. Rodwell) had said that the Bill was before a Committee of the Lords for seven days proved nothing but this—viz., the immense inconvenience of Irish local business being considered by Committees who had no practical acquaintance with the facts of the case. The facts were that the sanitary state of Dublin was about as bad as that of any town in the United Kingdom, and various attempts had been made by the Corporation to improve this state of things. But if there was one thing which was absolutely perfect in Dublin it was the supply of water, which might be said to be equal in quality to that of New York. The water-works were constructed at an immense cost about 20 or 30 years ago, and he believed he was correct in saying that the mains passed through Rathmines and Rathgar. It was now proposed by the Rathmines township to have an entirely new supply, and to get water from another source, thus altogether competing with the great public work carried out by the Dublin Corporation some years ago. But in no case could Rathmines obtain a better supply of water. The water which the Corporation offered to supply at a reasonable rate passed through Rathmines, and he considered that this was a case where the House of Commons should put its foot down and not allow the Bill to be passed through in such a hap-hazard manner.

The ATTORNEY-GENERAL for IRELAND thought that the course proposed by the honourable member for Dublin was exceedingly inconvenient. He could only repeat what had been said before—viz., that not only had the matter been thoroughly investigated by a Committee of the House of Lords, but it was by no means a reasonable thing that a corporate body like the Commissioners of Rathmines should not be permitted to supply themselves with water as they did with other necessaries. He had no word to say against the perfection of the supply of water to Dublin. Everybody said it was excellent, but this was no reason why Rathmines should not also obtain an excellent supply of water. There was no reason why the Dublin Corporation should have the privilege of selling water to the Rathmines Commissioners if the latter thought they could get better water elsewhere. In 1874 the Dublin Corporation expressly excluded the Rathmines Commissioners from their scheme, and so disabled the people of the districts from coming and asking for water, and therefore a clause was put into the then Bill providing that no one excluded from the scheme should be prevented from obtaining water for themselves. He, therefore, thought that, on all grounds, to throw the present Bill out would be a very strange proceeding indeed.

Mr. A. M. SULLIVAN thought that the House should very rarely interfere with the passage of a private Bill to Committee, and nothing but the most exceptional circumstances could justify such a proceeding. He, however, pointed out that the Boundary Commissioners had reported that the so-called city of Dublin would, they believed, become so enlarged as to take in all the small townships that had grown up around the old Municipality of Dublin, and it would be most mischievous if they allowed a number of these small, independent schemes for the supply of water to grow up, instead of having them all under one complete and central system of water supply. The noble lord (Lord R. Churchill), who was acquainted with Dublin, was also personally aware that nothing but mischief could ensue to the future schemes which the House would undoubtedly have before it if Bills like this one, which would constitute a group of petty interests, were allowed to pass. It was because the Bill would put a block in the way of useful reform that he should give his vote in favour of a course of procedure that he would not have supported otherwise than under most exceptional circumstances.

Dr. LYON PLAYFAIR said the honourable and learned member who had just spoken had based his objection to the Bill on the report of the Boundary Commission, which would come out at some future date; but he would remind him that if the boundaries of Dublin were to be enlarged, it would have to be accomplished by Act of Parliament, and the worst that could happen would be that the township of Rathmines, having obtained their water otherwise than from the Vartry, would have to prove their *locus standi* to represent their interests before having their scheme handed bodily over. He did not think this was a ground on which to prevent the present Bill from proceeding. The Bill had passed a careful examination in the Upper House, where the merits of the Vartry and the Dodder water were fairly put before the Committee. The Vartry water was exceptionally good, but so also was the Dodder water, which flowed through a silurian soil. He thought that the House of Lords having spent seven days over, and having reported one Bill in preference to another, it required more arguments than they had heard to induce them to reject the Bill. He held in his hand a petition from the Corporation of Dublin, which did not say one word about the Boundary Commission, but simply petitioned in the ordinary way that the Bill should be heard upon its merits when it went to Committee, and therefore he hoped the House would take the ordinary course of giving the Bill a second reading, and then letting it go to a Select Committee, where the Corporation of Dublin could be heard.

Mr. BROOKS said in consequence of what had fallen from the right honourable gentleman, he supposed he ought to be content with the discussion that had taken place; he would therefore withdraw his amendment.

The amendment was then withdrawn, and the Bill read a second time, and committed.

THURSDAY, JULY 1.

THE LIGHTING OF THE HOUSE.

Mr. DANIEL GRANT asked the First Commissioner of Works whether he would take into his consideration the advisability of substituting the electric light for the purpose of illuminating the House in place of the gas as now used in the roof.

Mr. ADAM said the question of lighting the House, and its approaches, with the electric light had received, and would continue to receive careful attention; but he was not prepared at present to recommend any definite form of action on so important a question, involving much change and alteration of arrangements, and which ought not to be finally adopted without going through the test of careful experiment.

LIVERPOOL CORPORATION WATER BILL.

The Select Committee on this Bill presented a special report, with minutes of the evidence taken before them.

FRIDAY, JULY 2.

The petition of The Gaslight and Coke Company against The Gaslight and Coke, Commercial Gas, and South Metropolitan Gaslight and Coke Companies Bill was withdrawn.

SATURDAY, JULY 3.

The petitions of (1) South Metropolitan Gaslight and Coke Company, and (2) Commercial Gas Company, against The Gaslight and Coke, Commercial Gas, and South Metropolitan Gaslight and Coke Companies Bill were withdrawn.

HOUSE OF LORDS COMMITTEE.

(*Before Lord* CLINTON, *Chairman*; *Lord* FOXFORD, *Lord* LEIGH, *Lord* GREVILLE, *and Lord* HANMER.)

BRITISH GASLIGHT COMPANY, LIMITED (STAFFORDSHIRE POTTERIES) BILL.

MONDAY, JUNE 14.

Mr. POPE, Q.C., Mr. MICHAEL, Q.C., and Mr. JEUNE appeared for the promoters; Mr. CLERK, Q.C., Mr. BIDDER, Q.C., and Mr. GREENE for the Corporation of Hanley, who opposed the Bill.

Mr. MICHAEL, in opening the case, said the Bill was of an extremely simple kind, it being merely for powers to enable the British Gaslight Company to spend a portion of their capital. The Committee were aware that in ordinary cases power was asked to raise further capital, but this Company required no authority for so doing, as they were a limited company with unlimited powers. They were, however, under obligations imposed by various Acts, and could not spend money in Hanley without being authorized by Parliament to do so. The Company were originally established by deed of settlement in 1824, but in 1857 they became incorporated, with limited liability. They had several stations where they carried on their undertaking, among them being the one in question, which supplied the town and neighbourhood of Hanley; they had also stations at Norwich, Trowbridge, and Holywell, and were interested in some works in Clonmel. In 1858 the capital of the Company was £42,800; but by an Act passed in that year further power was given to raise an additional £30,000. At the same time Parliament imposed on the Company various conditions, one being that the gas was to be of the illuminating power of 14 candles. Some of the others were then considered of a very exceptional nature—viz., that there should not be more than 20 grains of sulphur in 100 cubic feet of gas, nor more than 5 grains of ammonia. The object of the present Bill was to acquire adjoining lands by agreement, and to expend capital to the extent of £60,000, with the power of borrowing £15,000. It was originally intended that the

dividend to be asked for in the Bill should be 7 per cent., but the Committee were doubtless aware that, by the Standing Orders of the House, it was necessary that the auction clauses should be applied. There was, however, great difficulty in a company like that of the promoters disposing of their shares by auction, and they therefore consented that the dividend on the fresh capital should be reduced to 5 per cent. Since 1866 the amount of gas supplied had been practically doubled, and in order to meet the increased demand it was essential that more capital should be expended, so that the works might be further extended. The Company had not divided the whole amount of profit made among their Shareholders, as there was an amount of £11,328 which they might have appropriated, but which they had forborne to divide. There was one petition against the Bill—viz., that of the Mayor, Aldermen, and Burgesses of the Borough of Hanley, who were the Local and Urban Sanitary Authority, and who were also consumers of gas made by the Company. The petitioners urged that the inhabitants would be injuriously affected by the Bill; it was also stated that the gas consumers were entitled to a reduction in the price of gas. The petition then went on: "Your petitioners have long had reason to complain as to the quality of the gas supplied by the Company, and the high price charged by them;" but public analysts had continually made analyses of the gas, and it would be proved before the Committee that every single obligation imposed upon the Company had been fulfilled. There had been no single week in which there had been more than 20 grains of sulphur, and in no case had the illuminating power fallen below 14 candles, but had always been in excess. The petitioners also stated that efforts had been made from time to time to induce the Company to sell their works to the Corporation; and this was really the whole position. In 1877 the Corporation, with the general concurrence of the inhabitants, introduced a Bill for the purpose of acquiring the Company's works and undertaking; but the Select Committee of the House of Commons, after hearing the case of the Corporation, dismissed the Bill without having heard any portion of the case which the Gas Company were entitled to present, thus marking their sense of the proceedings. The Corporation were now endeavouring to raise again the same contention as they had done on a previous occasion; but in no single case had there been a provision inserted by Parliament into any Bill for the compulsory transfer of gas-works to a local authority; and the highest authority in the land—the Lord Chief Justice—had decided that corporations ought not to derive any profit from gas undertakings. He (Mr. Michael) thought that when capital was raised at so low a rate as 5 per cent., it was an argument in favour of the Bill. The petition further said that, as the Company still absolutely declined to sell their works, the petitioners submitted that no further powers should be conferred. The Gas Company had most economically expended their capital, and it was absurd to say that they had not conducted their business as an ordinary commercial enterprise, and that they had wasted their money. He utterly failed to see that an extension of capital would in any way be to the disadvantage of the Corporation or the consumers; and, the Bill being in strict conformity with the various Acts incorporating the Company, he asked the Committee to give it their sanction, as no case could be made out against granting the powers sought for.

Mr. *Frederic Lane Linging*, examined by Mr. JEUNE.

I am Secretary to the British Gaslight Company, which was incorporated under the Limited Liability Acts on Nov. 6, 1857. The capital of the Company is £300,000, in 15,000 shares of £20 each, the whole of which have been issued, and there is also power to raise money by the issue of debentures to the extent of £100,000. Under our Articles of Association we can, by resolution of a special general meeting, increase our share capital. The Company have five stations—Hull, Norwich, the Potteries (one of which is Hanley), Trowbridge, and Holywell; and besides, we have an interest in the works at Clonmel, which are under lease. Each branch is managed by a separate manager, and has a separate capital, while the accounts at each place are kept distinct. One set of directors manage the whole of the five branches, visit them periodically, and exercise a general superintendence over the whole of the districts. In 1826 our Company erected gas-works at Etruria, in Stoke-upon-Trent, and in 1852 additional works at Brownhills, near Birmingham, which aid in supplying the same districts. The amount of capital expended on the Potteries station up to Dec. 31, 1879, was £72,559. In 1858 the Potteries Gas Act was passed, the capital authorized by which was £42,610, and we were also allowed to expend £30,000 additional. On the former sum we were entitled to a maximum dividend of 10 per cent., and on the latter 7½ per cent. The Act of 1858 limits us, as to the erection of works, to the land which was scheduled in that Act. In 1866 we obtained another Act, by which our maximum price was fixed at 3s. 6d. per 1000 cubic feet; the illuminating power at 14 candles; sulphur not to exceed 20 grains, and ammonia 5 grains per 100 cubic feet. It also provided that the accounts of the Potteries district should be published in the form prescribed. All those conditions have been complied with and treated as binding down to the present period. In 1875 the Hanley Corporation began to make overtures to us for the purchase of our works, but the Company absolutely refused from first to last to sell. In 1877 the Corporation brought in a Bill for the compulsory purchase of the works, but it was thrown out by the Committee without the opponents being heard. Since then further negotiations have been initiated by the Corporation, but the result was the same—viz., a refusal to part with the works. In February of the present year a meeting was arranged between the Directors and a deputation from the Council, at which the following concessions were asked by the latter:—First, that the capital be £20,000, to be raised on debentures at 5 per cent., or else bearing interest at 5 per cent. with auction clauses, and that any premium obtained on the sale of the shares be applied to the benefit of the station; second, that an auditor be appointed by the Corporation, and his salary paid by the Company; third, no notice to be given to the Company when the testing of the gas was intended, and which may be made by an officer of the Corporation; fourth, non-treatment of residuals, but if residuals are treated, any loss on such manufacture not to fall on the station; fifth, the insertion of a clause that on giving twelve months notice, during a period of ten years, the works to be purchased by the Corporation by mutual agreement, but if that mode be found impossible, then by arbitration. I forwarded a reply in writing to those propositions, expressing the regret of the Directors that they could not agree to them, and this was the end of the negotiations. I have prepared a table showing the average illuminating power of the gas supplied to Hanley from 1866, when it was 14·60 candles, to 1879, when it was 15·76 candles. In September, 1875, the Corporation appointed Mr. Sparkes to be their chemical adviser as to gas, and a test apparatus for sulphur was fitted up at our office. The Company also appointed Mr. Sparkes to act for them, and he retained the appointment till 1879, when he resigned. [Results of the tests handed in.] In the years 1877 to 1879 there was only one case in which the illuminating power fell below 15 candles—viz., in May, 1879, when it was 14·92 candles. During the same period there was not a single instance in which the amount of sulphur in the gas rose higher than 17·42 grains; but in many cases it was only from 8 to 10 grains. After Mr. Sparkes left, Mr. Barlow, the Borough Accountant, was appointed by the Corporation to test the gas for them; but we appointed Mr. Knowles, a gentleman of considerable chemical experience, to test for us. Since the Corporation Bill was thrown out in 1877, no complaints have been made to us either with regard to the purity or the illuminating power of the gas. Although our price was fixed at 3s. 6d. per 1000 feet, we reduced it, when able to do so, as low as 3s. and 3s. 2d. From 1866 to 1873 we also supplied the public lamps at £2 15s. per lamp; and deducting 11s. 6d. for repairs, &c., gives 2s. 5d. per 1000 feet. In 1874 the price was raised to the rate of 2s. 9d. per 1000 feet, and this has continued to the present time. In consequence of having a central office in London and branch offices and administrations at various places, there are some general expenses to which each branch has to contribute its part; the proportion charged against the Potteries station is 1·35d. per 1000 feet sold. The cost at which we are supplying gas is the same as that at which Corporations in neighbouring places are able to supply it. The town of Hanley is a most difficult place to light with gas, inasmuch as the mining operations there are very terrible, and our mains are frequently broken, which causes a heavy charge upon the revenue. It is the highest point in the Potteries, and the leakage must be more there than in neighbouring townships. At Norwich the leakage is 6 per cent., while at Hanley it is 17 per cent. The same care is taken in one place as at the other. It has been as high as nearly 24 per cent., but has been reduced by laying out a great deal of money and exercising extreme care. Last year the figure was 14·28 per cent. The Burslem Corporation charge 4s. per 1000, and give 6d. discount if paid within a month. At Newcastle-under-Lyme the charge is 3s. 6d., with 5d. taken off if paid by the 15th of the second month after the quarter, but 2d. extra is charged in some villages a short distance away. The Stoke Corporation charge 3s. 6d. to ordinary consumers, and 4s. at Hanniford, which is within two miles of the works. The Longton Corporation charge 3s. 6d. within one mile, and 4s. beyond that distance. The Stafford Corporation charge 3s. 10d., with 5 per cent. discount if paid within a month. With regard to interest on new capital, as the Company cannot accept the auction clauses, they are willing, as a compensation to the district, to accept 5 per cent., which gives a better result to the consumers. I have made out a table which shows the amount of gas supplied year by year from 1866 to the present time. In the former year it was 60,640,500 feet from the Etruria works, and in the latter year 130,698,113, so that it has more than doubled, while our capital has remained the same. The land we now propose to acquire comprises 2 acres 1 rood 34 perches, and is well adapted for the purpose of extending the gas-works. For the year ending June 30, 1879, the capital of our Company represents only £4 1s. 9d. per ton of coal carbonized, whereas the average of the London Companies is £7 2s. 7d. per ton. We shall not be able to supply Hanley unless we have power to expend additional capital to provide increased works and plant.

[The cross-examination of this witness was deferred.]

Mr. *George Wilson Stevenson*, examined by Mr. JEUNE.

I have for many years known the works and the district of the British Company, and have been down to Hanley specially with regard to this application. The whole of the land at Etruria is inconveniently occupied by the works, and I am surprised the Company are able to carry on their business without creating a nuisance. The largest daily make of the Company is between 700,000 and 800,000 feet, and their storeage capacity is not equal to 400,000 feet, while in manufacturing districts the storeage ought to be equal to at least the largest daily make. The consequence is that the Company are compelled to keep a large reserve of retorts in action, and that is expensive, both with regard to wear and tear and labour. A new tank and gasholder ought to be made immediately to hold half a million feet of gas, and that would cost not less than £8000. If this application is granted the amount of capital asked for will be enough to last for 10 or 12 years; the increase of capital is not quite in the ratio of the increase of business. In my judgment the effect of limiting the dividend to 5 per cent. is as favourable to the consumer as the auction clauses, because the public invest their money in a well-established gas company at that rate. I am aware that the Company have not by a great many thousand pounds paid their full authorized dividends. Gas is supplied at Hanley as cheaply as it is reasonable to expect it to be done by anybody. The Company are very fortunate in having the possibility of acquiring such a site, it being only divided from the present works by a road, and is very valuable.

Mr. *Alfred Penny*, examined by Mr. JEUNE.

I have examined the Company's works carefully on more than one occasion, and can state that it is absolutely necessary the Company should obtain more land and raise more capital for the purpose of carrying out their parliamentary obligations. The illuminating power more than complies with the Act of Parliament under which they are working, and the price is so low that for many years the Company have not been able to pay their statutory dividends. There is a sum of £16,000 which the Shareholders would be entitled to receive if they could earn it. When such a price as 3s. 6d. is charged, and when the Company are performing all their parliamentary obligations, I cannot conceive how much better off the consumers would be even supposing the Corporation had the works in their own hands.

[The cross-examination of the above two witnesses was likewise deferred.]

Mr. *F. L. Linging* recalled, and cross-examined by Mr. BIDDER.

The parent Company is a limited joint-stock company, not in any way under the control of Parliament, but who have obtained parliamentary powers for the supply of different towns. There is no limit to the dividend payable on the capital of the Company; we divide what we can, and at present pay 10 per cent. We formerly supplied Stoke, Burslem, and Longton; but we gave them up under the direction of Parliament, and were compensated for our mains, goodwill, &c. We did not sell the works, because we had none there; we simply supplied the districts. The total expenditure of the Company in the Hanley works from 1826 to the present time has been about £72,500, and we are now asking for £75,000 more. We have treated this case as we treated Norwich and Hull; the capital for the latter place was £100,000, and we applied to Parliament for £100,000 more. The reason for doing so was that we should not have to apply to Parliament again for a long time, it being such an expensive thing.

Mr. BIDDER: If you were an ordinary incorporated gas company applying to Parliament for power to raise more capital, would not Lord Redesdale insist upon the auction clauses being inserted in your Bill?

Witness: From an interview with his lordship, I believe he is in no way favourably impressed with the auction clauses. Besides, they are not compulsory.

They are compulsory in this sense—that there is a Standing Order that they should be inserted?—I will explain. In 1878 the York Gas Company—a very large company—came to Parliament for power to raise more money, and they objected to the auction clauses, and said that if Parliament would grant them 5 per cent. they would accept it, and they succeeded. We have not inserted those clauses because we cannot work them. We do not come to Parliament to raise money for the Hanley station, but to be authorized to expend it.

If you had been an ordinary gas company, the auction clauses being inserted in the ordinary manner, the effect would have been that any additional capital required would have been raised by auction, and the premiums would go to reduce the nominal capital of the Company, and

would make the dividend to be taken from the consumers to be less *pro tanto*?—It would be so if we asked for high interest.

So that we are to be deprived of that advantage because you are in this unique position, and you tell their lordships that, owing to the fact of your being a joint-stock company differing from every other company, we are not to have the benefit of the raising of the new capital by the auction clauses?—Not at all; you are not deprived of it, because we only ask 5 per cent. for the new capital, whereas if we accepted the auction clauses we should very likely ask to divide a good deal more. We could not raise our capital at 4 or 4½ per cent.

Are you not aware that the Corporation intimated that they were perfectly willing to give you 25 years purchase—which is the same as 4 per cent.—of your maximum statutory dividend in order to buy your works?—Never. No sum was ever mentioned, except, I think, by the honourable member for Stoke, who, when he saw our late Chairman, spoke about £125,000, which was simply absurd; but we have from the very first stated most distinctly that it is not our intention to part with any of the works which we have held for half a century.

Whether that be so or not, whatever benefit would accrue by the ordinary process of raising capital by auction, we should lose, because you are a joint-stock company?—That is not so, because we are willing to accept 5 per cent. for this capital, which is a singularly small sum to receive; and when I state that you can buy gas property of the very best description now to pay you 6 per cent., do you think any man would be so beside himself as to lend us money at 4½ per cent.?

That is to say, you are judges of your own rate at which the capital shall be raised?—No; we are bound to Lord Redesdale's opinion. I explained to his lordship that we could not, from circumstances, accept the auction clauses, and submitted the York case to him, and he thereupon agreed to the Bill being proceeded with.

In your accounts for 1879 there are a few items to which I wish to draw attention—"Salaries, collectors commission, and payments to Directors and Auditors, £1810; professional charges and incidental expenses, £1347 16s. 9d." That is over £3000 for the year. Are those items charged against the Hanley works by the parent Company?—The charges are made by our Accountant in London, and then sent down to the Clerk of the Peace, and published twice in the local journals. I should like here to state that the form of accounts is the most disgraceful which any company could be forced to publish. I protested against it in 1866, but we were forced to adopt it.

Never mind the form of accounts. Is it not the fact that the present joint-stock company charge Hanley something over £3000 a year as their proportion of general expenses which you yourselves decide upon, which no one in Hanley has the details of, and with respect to which no one has a word to say?—They have power, if they like, to appoint an accountant.

Suppose we did appoint an accountant, would he have a right to go into the accounts of the parent Company, and have you produced the books of the parent Company to us?—I should certainly not produce those books, because they have nothing to do with the matter. We are incorporated by Act of Parliament, and under that Act we work. It would be no use giving you accounts which do not apply to Hanley at all. The items mentioned amount to 1·35d. per 1000 cubic feet charged. The Directors of the British Gas Company, who are men of very high position, only receive £1000 a year for the labours which they devote to the whole of the stations; and it is nonsense to suppose there is anything unfair charged for Directors fees.

I am not suggesting anything unfair, but I am putting it as a matter in which you charge us what you please, without any means of checking the correctness of it?—We do not charge you what we please. Every account, even to a petty cash entry, is passed by our Auditors, and it is not likely that accounts would be rendered which are inaccurate or dishonest.

Cross-examination continued: At Norwich they have an auditor who has a right to examine all our books, but I certainly object to the same thing at Hanley. I am aware that the course of legislation of late years has been to transfer gas and water undertakings to the control of the local authority, but it has been by arrangement, and not by compulsion. The Corporation of Hanley were before Parliament in 1877, seeking power to purchase our works, which measure was opposed by us. The Chairman, in giving the decision of the Committee, said they were of opinion "that the promoters have not proved the preamble of their Bill; but at the same time the Committee wish to express their opinion to the Company that they have given at times very just cause of complaint, both as regards the supply of gas and the want of illuminating power;" but I respectfully submitted at the time that that remark was scarcely fair. If we had been allowed to produce our witnesses we should have proved that the charges against us were utterly untrue.

Re-examined by Mr. JEUNE: That Bill was thrown out before we called a single witness. Each branch of the Company is under the control of Parliament, and the amount of capital to be expended and dividend to be paid, is defined by the various Acts. If this Bill passes, our accounts will in future be published in the same form as those of the Metropolitan Gas Companies. By the Act of 1847 there is power, if the profits are more than the amount prescribed, for the Court of Quarter Sessions, on the petition of any two gas ratepayers within the district, to appoint an accountant to examine the actual condition of the undertaking, and to make a report as to the truth of the accounts.

Mr. BIDDER: That is only after you have paid your maximum dividends and all your arrears; we cannot put that in force for years to come.

Re-examination resumed: We have nothing to disguise. What we show at Hull, Norwich, and other places, is shown at the Potteries, but I do not see why we should be placed under different provisions to those which apply to the Gas Companies of the Metropolis.

WEDNESDAY, JUNE 16.

Mr. *G. W. Stevenson* recalled, and cross-examined by Mr. BIDDER.

I am aware that gas coal can be obtained very close to Hanley, but I do not know the cost of it. I form my judgment as to whether the price charged is proper or not from the statements of account. The quantity of coal used last year was 17,430 tons, and the cost £10,041 4s. 8d. All the neighbouring works are managed by Corporations, and not one of them supply gas for less than 3s. 6d. If it is the case that at Stoke, besides paying interest, a large sum goes in relief of the rates, it is a very immoral thing to do.

Mr. BIDDER: Is there any reason why, supposing the gas-works were in the hands of the public authorities at Hanley, as good results should not be obtained there as are obtained at Stoke, Burslem, and other places round about? Would it be necessary to charge against working cost something over £3000 for the expenses of a parent company in London?

Witness: They have to find accountants, collectors, and somebody to act as secretary, so that a portion of that £3000 would have to be paid. Incidental expenses apply as much to the case of a corporation as of a company; but of course there would be a reduction in the item of directors and auditors.

Which would go to the benefit of the consumers ultimately?—I do not know about that; it might go to the benefit of the ratepayers.

They are almost convertible terms?—No; it is the greatest fallacy in the world to suppose that ratepayers are necessarily consumers.

They get the benefit of the public lights if they do not burn gas themselves?—I suppose the consumption of the public lights is one-tenth of the whole.

Can you explain how it is that being limited by Parliament in particular districts to 7½ per cent. as to a portion, and 7 per cent. in some cases, they succeed in dividing amongst their shareholders 10 per cent. on the whole?—I can only do so in this way—that they have other sources of income beyond the works in the Potteries and at Hull and Norwich. They have two undertakings not controlled by Parliament—viz., Holywell and Trowbridge.

You are aware that the consumers of Hanley have, as soon as the maximum dividend is earned and the arrears of dividend are paid up, the right to a reduction in the price of gas under the present law; do you not think, therefore, that they have a distinct interest in knowing that they are not charged with more than is lawfully chargeable against the cost of making the gas and carrying on the works?—Yes.

Do you think it reasonable that the Company should be at liberty to put down what they like for Directors fees, and that the people and Corporation of Hanley should have no control over it, or power of checking it?—I do not think it is reasonable that they should put down what they like, but I think it reasonable that they should act as they do—viz., manage the whole of the concern in London, and charge the proportion of the cost to each place in the ratio of the capital invested. No individual or corporation has the right to go to a railway company and say, "Show me your accounts—I want to know whether you are charging what is fair;" and it is the same with a water or a gas company.

The auction clauses being generally applied as a condition to the raising of new capital, is it reasonable that the people of Hanley should be deprived of the benefit of that provision because the British Gaslight Company happen to have a peculiar constitution?—The consumers of Hanley do practically get the benefit of the auction clauses by the new capital being raised at 5 per cent.

Do you mean that the stock of the Company is not worth more than 5 per cent.?—Not worth more than 5 per cent. to buy. It is one thing to buy stock in the London market—new capital which has yet to earn its dividend—and another thing to buy the stock of a company which is earning its maximum dividend.

If the stock cannot realize in the market more than 20 years purchase, the offer of 25 years purchase of the maximum statutory dividends was excessively liberal, was it not?—No; I think not, because the two things are quite different. The offer of capital in the open market to be expended on the undertaking would not realize more than 5 per cent., because it is doubtful whether the capital which is yet to be expended will earn this dividend. There is no doubt about the capital which has been expended earning dividend; one is a secured thing, but the other is unsecured.

Supposing the works were in the hands of the Corporation, they would probably be able to raise the capital at 4½ per cent. *ex* sinking-fund?—*Ex* sinking-fund; but then they have to provide that fund.

In point of fact, if the capital were raised by the Corporation the consumers would gain the benefit to the extent of 3¼ per cent.?—Not till after 50 years.

Cross-examination continued: I used to express an unhesitating opinion that corporations ought to have possession of both gas and water works, but I have modified my opinion very much in the last 15 years, one reason being that corporations keep up the price of gas unduly in order to benefit themselves and the ratepayers at the expense of the consumers of gas. I do not think that gas companies unduly keep up the price. My experience of corporations is that they expend their money on capital account more freely than companies do. There is less difficulty in getting the gas committee of a corporation to spend money than a board of directors.

Mr. BIDDER: You are asking the Committee to sanction £75,000 to bear 5 per cent. interest; therefore if we give them 25 times £5, we should give £125 for every £100 put into the concern?

Witness: Yes; and when they take the £125 to re-invest it, they will get 4 per cent. for it, and no more.

You do not agree with Mr. Linging who told us that gas stock could be bought in the market to-day to pay 6 per cent.?—Metropolitan gas stock can.

Then for the £100 they put into the concern they get back £125, which they can take into the market and re-invest in Metropolitan gas stock to pay them £7 10s. interest?—I cannot see that.

Six per cent. would be £7 10s. on £125; so that they increase their income by all that?—No; besides, Metropolitan gas stock is very fluctuating. A little while ago it could not be bought to pay more than 4 per cent. Then the "scare" came, and it could be bought to pay 7 per cent., but now it is recovering a little, and can be purchased to pay 6 per cent.

Re-examined by Mr. MICHAEL: The Rotherham case is the only one in which the Legislature have granted to a corporation power to acquire a gas undertaking compulsorily, but there was a very good reason for it. The Corporation showed how the Company had misconducted themselves for a long period, and the walls of the committee-room were placarded with test-papers for sulphuretted hydrogen which were as black as a hat. In the event of an inquiry before the Court of Quarter Sessions all the books of the Company relating to the manufacture of gas must be open, under penalties, to the inspection of the accountants; and the investigation, moreover, is to be at the expense of the Company.

Mr. CLERK: With regard to the Hanley books, of course we could demand to see them, but not the London books.

Mr. MICHAEL: Any single charge which occurs would be investigated; and therefore if any charges occur for management which are in the books of the Company, all those books must be examined in order to show that those charges are right.

A MEMBER of the COMMITTEE said that he was concerned in the Birmingham case, and thought that it was a compulsory transfer.

Mr. MICHAEL said that in the case of the gas undertaking, it was by an agreement which had been entered into a year or two previously.

Mr. CLERK said that was the case with regard to the gas, but the water transfer was compulsory.

Mr. MICHAEL said it was *quasi*-compulsory. A clause had been inserted in an old Act of Parliament enabling the Birmingham Corporation to purchase the water undertaking; but it was necessary for fresh powers to be given to the Corporation on account of the money value having risen considerably, and the original powers not being sufficient to enable the Corporation to purchase.

Mr. *Penny* recalled, and cross-examined by Mr. CLERK.

The district supplied by the British Gas Company is undermined, and that causes a large amount of leakage, and reduces the profit. The working expenses are also very much increased by the sums continually being expended in protecting themselves against this leakage—examining pipes, reinstating them, and so on. The Company are also putting aside at every proper period a sum of 2 per cent. which, while it enures to the keeping down of capital, certainly reduces the amount of profit there would otherwise be to divide.

Mr. CLERK: Is that sum actually set aside, or does it merely appear in the accounts?

Witness: It is not actually set aside, but from inquiries I made I consider it a very peculiar item in the accounts. I believe it actually does go in the reduction of the amount of capital spent, and I am told that is the destination of it.

Cross-examination continued: I was not aware that there were only two Shareholders in the British Gas Company residing in Hanley, but any one could become a shareholder by purchasing shares in London, the price being about £35 or £36 per £20 share.

Mr. CLERK: Can you tell their lordships of any similar case to that of the British Gas Company, being in the possession of gas-works over different parts of the country with which they are utterly unconnected?

Witness: I am not aware that there is, but I do know that all the places supplied by the British Gas Company are supplied at a very low price. In Hull the price is 2s. 6d., but circumstances there enable it to be done; and wherever that is the case I believe the Company have a strong desire—perhaps from the peculiarity of their position—to stand well with their customers.

Re-examined by Mr. MICHAEL: I have looked over the accounts of the Company, and having regard to the amount of business done, I cannot see that any of the charges are in excess of what they ought to be in a well-conducted gas company. The ordinary plan adopted by gas companies is for any expense incurred for replacement of old stock to be charged to revenue, and anything new to be charged to capital.

Mr. *Robert Paulson Spice*, examined by Mr. JEUNE.

I have examined the gas-works at Hanley, and consider the space so confined that the works cannot be carried on so economically as they could be if there were more room, and to some extent this is prejudicial to the production of gas. I have never seen works where greater economy was practised or more intelligence displayed in the mode of conducting the business. Every possible expedient has been had recourse to for overcoming the difficulty of their position. Coals are lifted by steam power from barges on to a little tramway, and then run along and dropped down into the furnaces. There is no coal store, but the coals are used from hand to mouth. It is a matter of great inconvenience to the manager and workmen to carry on the works in such a way, but nothing can be more economical than their mode of doing it. The time has now arrived when it is absolutely indispensable that the Company should have additional ground close by, on which to build new or supplementary works; and I think they are specially fortunate in being able to secure the proposed site. They cannot carry out the works required without further capital, and certainly they ask for much less than is usually applied for when companies come to Parliament.

Cross-examined by Mr. CLERK: I have not looked at the history of the Company or their Acts; I have merely looked at the state of the case as regards their manufacturing power and the new land. I have not regarded the accounts at all; nor do I, as a rule, in my general practice, trouble my head about population in connection with gas undertakings. It may be that a large population will require a comparatively small gas supply, and a smaller population not far off may require a proportionately larger gas supply. The supposition that any population would remain constant anywhere for 20 years is one which I cannot entertain. I take the population throughout the country, and the normal rate of increase as being doubled in nine years, or perhaps in less. Without any increase in population I have known a considerable increase in the gas supply, through its being cheapened in price, and being used for so many more purposes than formerly.

Mr. *Harry Edward Jones*, examined by Mr. JEUNE.

I have been for many years practically acquainted with the construction and management of gas-works.

The CHAIRMAN inquired if the same ground was to be gone over again. They had had several engineers already.

Mr. JEUNE said he would only examine on one point.

Examination resumed: The Company's district is supplied satisfactorily throughout, and with moderate initial pressure, showing that the distributing plant is in good order. The works are conducted in the best manner that could be devised for supplying good gas in abundance, and I never saw works on the same scale so completely equipped with purifying plant. The only defect is the great want of gasholder room, which the Company must increase shortly if they are to comply with the compulsory position they are in to deal with the growth of their business. The capital expenditure of the Company works out to £470 per million feet of gas per annum, which is a little over half the usual proportion of capital to business done, and shows that the greatest economy has been practised in the administration of the capital account of the Company. I think the increase of capital asked for is fair.

Cross-examined by Mr. CLERK: I tested the gas for sulphuretted hydrogen and ammonia, and found it pure.

Mr. CLERK: You have said that the price of £470 per million feet was low; is not that accounted for by charging 2 per cent. for the depreciation fund, and expending that upon the restoration of the plant?

Witness: I am not able to say how long 2 per cent. has been charged. We are told since the year 1866?—I do not think that within that period it could have enured so much to the benefit of the Company as the figures show.

Mr. *Robert Linging*, examined by Mr. JEUNE.

I have been Manager of the British Gas Company's works at the Potteries since June, 1875, and before that time was Assistant Manager of their works at Hull. With my experience of the works a further extension of land and a new gasholder are particularly required. We find very great difficulty as to the sale of coke, arising from the want of storeage room for it. In 1877 we sold 83 per cent. at 5s. 2d. a ton, long weight; in 1878, 60 per cent. at 4s. 3d.; and in 1879, 40 per cent. at 2s. 7d.

The CHAIRMAN said he thought these facts might be taken as admitted, there being no dispute about them.

Examination resumed: I quite agree with what has been said as to the Hanley district being peculiarly difficult to supply, owing to the condition of the ground. On an average for the last five years the leakage has been about 14½ per cent., while at Hull it has been only 8 per cent. We have had 256 mains broken during the last four years, and between 900 and 1000 joints drawn, which is an unusual amount. Since 1877 we have had no complaints from the Corporation respecting the purity and illuminating power of the gas.

Cross-examined by Mr. CLERK: The land proposed to be occupied has been held by trustees connected with the Company for many years past, but I do not know whether any interest has been paid for the purchase. Our mains at the present time extend throughout almost the whole of Hanley, but when new streets are formed we have to lay down new mains. In 1879 we had 4158 consumers in Hanley, and 1223 in Tunstall. The two districts are supplied from separate works, the sale of gas in the former last year being 122,060,000 cubic feet, and in the latter 29,166,000 cubic feet. The percentage of leakage of gas in Tunstall was only 6¾ during the half year ending June, 1879, and 8·19 for that ending December. The loss by leakage during the latter period in Etruria was 13·41 per cent. The difference between the gas made and that sold was about 8 million feet, or 6 per cent. In 1878 the make at Hanley was 127 millions, but I have not the figures here of the gas sold. The amount of gas consumed on the works is all registered, and is not included in the "unaccounted-for gas." The leakage at Brownhills for the year 1876 was nearly 23 per cent., but we had a great number of broken mains at that time, owing to mining operations. Since that time we have renewed the mains and made them stronger, and the district is now more looked after. The price of coal in 1879 was 11s. 7d. per ton delivered into the works. It was unscreened coal from the Frogmore Hall Collieries. It is delivered from the railway on to the canal, and then into the works. I am not aware that the same coal is delivered at Burslem for 8s. 4d.; but the railway runs directly into the works there. Our contract was entered into two years back, and will expire in about a month's time, to my recollection. If we were to make a fresh contract, it would be considerably cheaper, and that would diminish the cost of manufacture. We sell our tar for about 2½d. per gallon, or 42s. per ton; but the ammoniacal liquor we manufacture into sulphate of ammonia at the Tunstall works, and I consider that to be a profitable business, although I cannot tell the actual profit, as the accounts are made out in London. The burner employed at Hanley for testing the illuminating power of the gas should be 14-hole brass Argand burner; but the tester invariably uses the "London" Argand burner, which is a superior burner, but does not improve the gas in any way. The cost of erecting the sulphate of ammonia works at Tunstall was about £800, but I do not know where the money was found for that purpose. When we are going to lay mains we do not give notice to the Corporation that we are going to take up the streets, because I think no notice is required.

Re-examined by Mr. JEUNE: The contract for our tar at 42s. was made three years ago, but we have reduced that contract 2s. per ton to the end of December, owing to the bad trade. Owing to our want of space, we have to get rid of our coke at a sacrifice. We are not near any railway, and have to sell it to merchants in Birmingham.

A MEMBER of the COMMITTEE: What becomes of the gas that is not sold?

Mr. JEUNE: It leaks out through the mains and joints, and is wasted in a variety of ways; and there is the condensation also.

By the COMMITTEE: There has been a decrease in Tunstall from 36,867,800 feet in 1876 to 31 million feet in 1879, but that is owing to the bad trade of the last four or five years.

Mr. JEUNE: The leakage has decreased during those years.

A MEMBER of the COMMITTEE: Those Tunstall works must be struck out as an element in the need for an increased supply, because there is not an increase, but a decrease there.

Mr. JEUNE: But there the question of leakage comes in. A less amount goes out, but then it nearly all reaches the consumers; in other words, the less leakage the less gas need be made in order to supply the same quantity. It can be proved, if necessary, that the quantity sold in Brownhills during those years was as nearly as possible constant.

Mr. *Miles Knowles*, examined by Mr. JEUNE.

I reside at Tunstall, and am a Chemist and Teacher of Chemistry. In October, 1879, I was appointed by the British Gaslight Company to test their gas, and produce the results of the same. In November, 1879, the illuminating power was 15·70 candles; December, 16·36; January, 1880, 16·24; February, 16·06; March, 14·62; and April, 15·82. The average of sulphur for November, 1879, was 12·7 grains; December, 16·04; January, 1880, 11·53; February, 13·51; March, 14·09; and April, 14·59. I have only once found the illuminating power less than 14 candles, and that was on March 19 of this year. It was 13·52 on that occasion, but I afterwards found it arose from an escape in the pipe after passing the meter. On two occasions only did I find the sulphur exceed 20 grains—Dec. 23, 1879, when it was 23·7; and March 23, 1880, when it was 22·74. The tests were made at the offices of the Company in Pall Mall, Hanley.

Cross-examined by Mr. CLERK: My mode of testing is to allow the gas to pass through a meter, which registers it, and then it is consumed at the burner at the rate of half a foot per hour under a glass trumpet-shaped tube, the upper portion of which is connected with an *éprouvette* containing glass marbles, which enlarge the surface over which the consumed vapours have to pass. On the burner is placed a quantity of carbonate of ammonia, the vapour from which combines with the carbonic acid and the sulphuric anhydride to form carbonate of ammonia and sulphate of ammonia. Any vapours which will liquefy are condensed on the marbles, and run into a small glass vessel placed below. I have not tested for ammonia at the office, but I have done so at the works. On the occasion of the gas being only 13·52 candles, the Borough Analyst was with me, testing for the Corporation, and we both discovered there was an escape.

Re-examined by Mr. JEUNE: The apparatus used for sulphur testing was the one used by the Borough Analyst, and never objected to; and the one also employed by a special gentleman sent down from London—Mr. Foster—who likewise did not object to it.

By the COMMITTEE: The presence of ammonia in gas would be injurious in any large quantity; but we know that gas companies now are rather anxious not to allow any ammonia to pass, as they make a profit out of it.

Mr. JEUNE said this was the case for the promoters.

Mr. CLERK, in addressing the Committee on behalf of the Corporation, asked their lordships not to proceed further with the Bill. The unique character of the British Gas Company had been more than once admitted during the progress of the Bill. They had before them a company established by deed in the year 1824, at a time when gas was in its infancy, and when nobody knew whether it would be a profitable speculation. They were not established by any Act of Parliament, but by a deed of association among themselves, under which they continued for a number of years; and it was not till the year 1856 or 1857 that they became a registered company for the purpose of carrying on business. Under the large and indefinite powers which they had, they undertook to supply gas to a great number of places, and, no doubt, very beneficially at that time, because, 56 years ago, everybody was much interested as to the mode of carrying on the manufacture of gas. In 1826 they took up the supply not only of Hanley and Tunstall, but also of Stoke, what was now in the district of Longton, the district of Burslem, and the greater part of the Potteries district. Most of these districts by degrees passed away into the hands of local gas companies, and were subsequently transferred by Acts of Parliament to different local authorities or corporations; and now Hanley and the adjoining small district of Tunstall alone remained, in that neighbourhood, under the operation of the peculiarly constituted British Gas Company, although they still retained the power of manufacturing gas at Hull, Norwich, and Trowbridge. Supposing it were the case of an ordinary gas company, which had been in existence for a good many years, applying for an increase of powers for manufacturing gas, the local authority might come forward and say it was the universal desire that the gas manufacture should be transferred to the Corporation, but that the Company should be paid a fair sum for what they had laid out, and he thought the recent decisions of Parliament justified such an application. But the parties stood in a most extraordinary position in the present case, because the British Gas Company had been in possession—though not with the consent of the borough of Hanley—of the gas supply for a number of years. In 1877 the Corporation introduced a Bill

for the purchase of the Gas Company, but without success, on the ground that it was not usual to exert such powers of transfer except the Company were asking for fresh powers. Was there ever a more extraordinary thing than that of the Company coming and asking for an enormous increase of capital, which was absolutely unnecessary, and for which there was no justification? The Company had supplied gas at the same price as the towns of Stoke and Burslem were charging, and yet they said they could not earn their statutory dividends, and also that there was a deficit in June last of between £11,000 and £12,000 which they were entitled to as dividends; but, strange to say, during all this time the adjoining districts had been making sufficient profit out of the same price to pay their statutory dividends. The parent Company had also, during all the time, been paying 10 per cent. to their Shareholders, and the Corporation said, "Let us know how that has arisen. You have the books in London, which show the whole management; show us the way in which the profits are made." "No," they said; "you shall only see what we pay for coal, the cost of manufacturing, directors fees, and so forth." But there must be a great deal undisclosed in the books kept in the London house. At Hull they only charged 2s. 6d. for their gas, and Hull was not situated within four or five miles of the coal-fields, like Hanley, but they had to carry their coal 50 or 60 miles. As a matter of fact, the land proposed to be acquired by the Company was already in their possession, and had been so for a number of years, and had been paid for.

Mr. JEUNE said that was not the case.

The CHAIRMAN inquired whether the Company had used the land.

Mr. JEUNE said they had not.

Mr. CLERK said he should be able to show they had been in possession of the land for a number of years. The Corporation were ready to give the Company 25 years purchase of their maximum statutory dividend, and he asked their lordships whether they did not consider this a very liberal offer. The whole area of the Company was 17 acres, and the greater part was built over. For some years past the works had been perfectly stationary, and since 1876 there had been a decrease instead of an increase in the amount of gas produced. Under these circumstances he asked their lordships what justification the Company had to ask for such an enormous additional capital as they now applied for. He also pointed out that the people of Hanley knew nothing of the expenses apportioned to Hanley, and had no power of ascertaining whether those charges were correct or not. In conclusion, he expressed a hope that their lordships would not proceed with the Bill without limiting the capital, and also providing for the transfer of the works to the Corporation of Hanley upon reasonable terms.

Mr. *John Bromley*, examined by Mr. CLERK.

I am the Mayor of Hanley, and have been a member of the Corporation since 1873. The borough was incorporated in 1857, and the population is estimated at 50,000. There has been a very strong feeling in Hanley for a long time past with reference to the possession of the gas-works by the Corporation. The whole of the ratepayers are not direct consumers, but they all participate in the consumption of gas, because the ratepayers have to pay the Corporation a large amount for lighting the streets. The present Bill was brought under the notice of the Town Council on November 10 last, when the Town Clerk was requested to inquire whether the Directors of the Company would be inclined to treat for the sale of the works, to which a reply was received that the Directors had no intention to part with their Potteries station. At a statutory meeting called for the purpose, a resolution to oppose the Bill was carried with only one dissentient. The Corporation pay £2100 for lighting the streets and public buildings.

Cross-examined by Mr. JEUNE: The number of inhabitants I have given has nothing to do with Brownhills, but simply with the borough. I am not aware whether the limits of the Etruria works extend outside the borough. We think it would be better for the supply of gas to be in the hands of the Corporation than of a private Company.

Mr. JEUNE: That is a little vague. Why better?

Witness: Because our neighbours are doing better with it.

That again is vague. What good do you expect to get if you are allowed to purchase these works?—The general feeling is that we should get more advantages than we have at present.

That also is a vague reason on which to come to Parliament and confiscate our property?—I do not propose to confiscate it.

Then what advantages do you propose to get?—We should not have a private company interfering with our streets, and cutting them up in the way they do at the present time, and that is a very sore point with the Corporation. In several cases in my own experience, the moment we have made and metalled a street (and there is very great traffic in the borough of Hanley) we have found it cut up, and it is very much to the disadvantage of the ratepayers, in my opinion. It is being done now in the principal thoroughfare into the borough. Two years ago that road was cut up by the Water Company, and has been dangerous ever since; and now, when we were just getting it into something like decent order, the Gas Company are going down the same road.

Do you not suppose that the Corporation would have to open the streets if they made the gas themselves?—We should have better sense than to open them just after we had made them. I do not say that the Gas Company open the streets unnecessarily, but I say they do not consult the interests of the ratepayers.

Would it not have been more to their interest, when the street was opened, if they could have done so, to have put down their pipes, and have saved the expense of opening and replacing?—I do not suppose the Water Company would have let them lay down their pipes at the same time.

Cross-examination continued: I could not say that the Gas Company ever opened the streets unnecessarily. I believe if we had the concern we should manage it differently. At Stoke matters are arranged very well, and have given a profit to the ratepayers, but I have not been into the figures.

Mr. JEUNE: What is it that you suggest that more money is spent upon at Hanley than need be spent?

Witness: I cannot say.

But you think that, somehow or other, you are going to make more money?—I think so.

It is the interest of the Gas Company to make as much money as they can out of their works?—No doubt.

They have had great experience, with their five stations, for very many years?—Yes.

And yet you think that you, with no experience, taking the matter up for the first time, are going to do the thing much cheaper?—Yes.

Re-examined by Mr. CLERK: Both at Stoke and Burslem, since they have been detached from the British Gas Company, a deficit has been converted into a large surplus, and there is no reason why the same should not be the case at Hanley. When the Corporation had to alter or re-metal a street they would take care that any alteration to the gas-pipes would be done at the same time.

Mr. *Henry Woodall*, examined by Mr. CLERK.

I am Manager of the Leeds Corporation Gas-Works, and before that I was ten years at Burslem and two at Longton. There is no difference in the character of those districts and Hanley, mining going on more or less. I have seen the proposed Bill, and do not consider the capital asked for is required, because I find that the capital of the Company does not augment in the same ratio as the increase of business. My experience at Leeds is very decided upon this point, because prior to 1870 the Companies had expended £600 for every million feet sold per annum, but since I went to Leeds, in 1875, the expenditure upon the increase of business has been at the rate of £282 only, or less than one-half of what it was ten years ago. The area of Hanley is a very concentrated one. Gas property is a thing now so perfectly well understood that the risks can be thoroughly appreciated, as is proved by the conduct of this Company in accepting 5 per cent. as the rate of dividend. As proof that £75,000 is not required in this case. I may mention that during the time I was at Burslem—I think for the last six years of my management—there was no addition whatever made to the capital account; the whole additions to the business were made out of the revenues of the period. I have left there five years now, and there has not been an addition to the capital account during the whole of that time. I should say about £30,000 would be quite sufficient. I think that the price fixed by the Act of 1858—3s. 6d., which is the maximum now charged—is very high, and the proof of this is that in 1871 and 1872 the same Company sold gas as low as 3s. If they could sell at that figure then, it should certainly be lower now, because they have not added to their capital account proportionately, and all the residuals, with the exception of coke, sell for higher prices than were ever previously realized. In addition to this, they have had a very large increase in business. I cannot tell how it is, with a price of 3s. 6d., they cannot make their full dividends. Their management seems to me to be very thriftless, because I have gone most carefully into the accounts, and my estimate is that gas should be made and sold there for 2s. 4d. per 1000 feet. In the case of the surrounding districts, they not only paid enormous premiums for the works, but they hand over a sum of £2000 a year for reduction of rates. It appears to me that the British Company are at a great disadvantage in not having resident directors. It has been given in evidence that they are paying 11s. 7d. per ton for coal, but I know that coal is now being purchased of the same quality at 8s. 4d. in Burslem. We have been told that the contract dates back two or three years, but that shows the want of prescience on the part of the Directors to have bought so far ahead as they did in a falling market. Directors who are residents are also often manufacturers, and when they have achieved the highest dividend possible their interest lies in reducing the price of gas. Some years before I left Burslem I thought there was a good thing to be made out of a transfer of the works to the Burslem Company, and endeavoured to open negotiations with that object, but they did not come to anything. When the British Gas Company were first established in the Potteries they had the exclusive possession of the whole field, and there can be no doubt that if they had been sufficiently enterprising they would have retained possession of the district to this day. As the districts were separated from the parent source of supply, they established works of their own, and they have all been profitably carried on. The Hanley works only paid statutory dividends in the years 1870-71-72-73, or four years out of 14. Without going minutely into the statement, I may say that there is a difference of economy in comparison with Burslem of 6·72d. per 1000 feet. There is not the slightest advantage in the situation of Burslem with reference to getting coal cheaper. Under the most favourable contract we made we were supplied from the same colliery. When supplied from the North there was a slight disadvantage to us; but if supplied from the South there would be a similar advantage to Hanley. When I first went to Leeds the price was 3s. 9d. per 1000, with a discount of 2d. Since that time it has been reduced at an average of more than 4d. per annum, and the present price is 2s. 2d., but I anticipate that on July 1 next it will be again reduced to 1s. 10d. From my knowledge of the Potteries district I will undertake to give up my situation at Leeds and take the management at Hanley, and my income should be solely dependent upon my realizing maximum dividends at 2s. 4d. per 1000 feet, or a reduction of 1s. 2d. upon the present price.

Cross-examined by Mr. MICHAEL: The quantity of gas made at Leeds is 1350 million feet, but I do not think the quantity makes any difference. The price charged in London varies from 3s. to 3s. 6d. I have never offered my services to any of the London Companies to reduce the price to 2s. 4d., because there would be little use in my doing so.

Mr. MICHAEL: I wonder your valuable services are not eagerly bought up by some of those large companies.

Witness: It is a great pity they are not. As to the comparison between Leeds and Hanley, I think I never manufactured gas so cheaply as I did in the smallest works I ever managed—Longton. There was a question between me and the Manager at Stoke, as to one halfpenny per 1000 feet, but I do not know who was the victor. One delivered gas into the holder at 5½d. and the other at 6d., but I have never been able to do so at Leeds for 5½d. I am a little at variance with engineers of other gas-works.

Have you looked at the price for coke obtained by this Company? In 1873 they obtained 17s. 3d., and in 1874 16s., as against 2s. 9d. in 1879?—Whereas in Hanley in 1873 they appear to have been selling coke at 17s. 3d., the Burslem Company were realizing 24s., and therefore I say that this Company were not only buying coals too dear, but selling residuals too cheap.

Cross-examination continued: In Burslem the examination for sulphur was a rigid one, and the Company there were in advance in their efforts to get rid of it of any company outside London.

Mr. MICHAEL: How do you make up the 2s. 4d. which is to produce the statutory dividend which you are going to earn?

Witness: I have made an estimate for 1881, and have taken the Company's statement that they will increase at the rate of 5 per cent., although I have no doubt that when they get a new gasholder and reduce the price they will achieve more than that increase. Then I take the coals as producing 9203 feet per ton, but 9500 is a common average in the district. I take 20,478 tons to produce the quantity of gas required, and I estimate that coal will cost 9s. per ton. I allow 15 per cent. for leakage, which is double the actual rate as given in evidence; I deduct residuals, coke producing 8 cwt. per ton of coals, and selling at 6s. 8d.

Mr. MICHAEL: Do you put it to the Committee that this Company might have obtained 6s. 8d. for coke, and have wilfully sold it for 2s. 9d?

Witness: It is the fact that coke is selling in the district now at that price.

Cross-examination continued: Tar I put down at 10 gallons per ton of coal, and selling at 40s. per ton; but I am getting 46s. per ton. Ammoniacal liquor I have put down at 25 gallons per ton of coal carbonized, and selling at 20s per ton; but I am realizing at Leeds 35 gallons, so that I am exceedingly liberal. These items together—coke, tar, and liquor—produce £7105, as against £9215; so that coal costs the net sum of £2109. Purification I have reckoned at 1d. per 1000 feet of gas manufactured, while at Leeds it is not costing as much as ½d.; wages, 4d. per 1000 feet, upon the supposition that they pay 35s. per week to the stokers, but I do not think they pay so much. Repairs and maintenance of works I have put down at 5d.; at Leeds it is 4d., and the British Gas Company's actual expenditure has not been so much. Salaries and collection, 2d. per ton,

which is in excess of what is paid at Burslem. I allow £200 for directors and auditors—double what is paid by the Burslem Company. Rates and taxes, 1½d., which is the average of all the companies I know anything about. Stationery and general charges ¼d., or six times as much as we pay at Leeds. Then I take the authorized dividend of £6511—that is supposing they have called up all they are entitled to—and to this I add £400 as interest at 5 per cent. upon the expenditure of £8000 for the new holder they talked of; so that it gives for dividend and interest £6911. Gas I take at 3s. 3d. per 1000 feet all round, and allow 1½d. for meter-rents, which gives £27,200; and the balance that I have remaining after paying the maximum dividend is £7185 14s. 8d., or 10·8d. per 1000 feet, and if you deduct that from 3s. 3d. we have 2s. 4d. I do not put down anything for depreciation, because the value of the works is supposed to be maintained out of the 5d. which I have allowed.

Mr. MICHAEL: Coals 9s., and you take credit for 6s. 8d. for coke. I suppose the price of coke bears some relation to the price of coal, does it not?

Witness: That is not very certain, because I remember at the time when coal went up 100 per cent., coke went up 200 per cent.

Cross-examination continued: The cost of purification in London is 1·09d. per 1000 feet, so that I am only 3-100ths of a penny behind, and this notwithstanding that in London they are under the strictest regulations, and are spending enormously in plant. It is difficult to compare Hanley with London, because the cost of everything in the latter is so enormous by comparison with what it is in the country.

Mr. MICHAEL: Can you account for the fact that if these gentlemen can make the gas at this price and earn a large profit, and persons are anxious to purchase it, and the purchase is to be determined by the amount of profit capitalized, how it is that the Company earn such a small profit instead of a large one?

Witness: No; the whole conduct of the Company to me is inexplicable.

Mr. MICHAEL: And to me too, on your hypothesis.

Mr. *Edwin Powell*, examined by Mr. CLERK.

I am a Magistrate for the Borough of Hanley and an Alderman there. I am a china and earthenware manufacturer, employing over 500 hands, and during the winter months they pay for the gas consumed in their separate workshops. Negotiations were lately opened with the British Gas Company with a view to the purchase of their undertaking, and I was a member of the deputation which waited upon the Directors. In 1876 it was intimated by the Company that they were willing to sell the works to the Corporation if a sufficient price was paid for them, but no agreement was arrived at. We were aware that the Company at that time were not apparently earning their statutory dividends, but with a view to a settlement, we added that the Corporation would probably be willing to give them annuities equal to their statutory dividend. A proposition was then made from the Council, the result being that the Company would not entertain either that or any other proposal for the sale of their works. The inhabitants of Tunstall concur in the desire that we should become possessors of the gas-works. In looking over the accounts of the British Gas Company with reference to Hanley, I find an extraordinary state of things. In 1879 they paid no less than £1530 for wages, which is nearly 15½ per cent. upon the revenue, while in the case of an adjoining gas undertaking the same item was only 7½ per cent. upon the revenue.

[The witness was not cross-examined.]

Mr. *Edwin John Hammersley*, examined by Mr. GREENE.

I am an Accountant at Hanley, and a Member of the Town Council. The Bill of 1877 was promoted in consequence of complaints as to the quality of the gas, and also through knowing that our neighbours, Burslem, Tunstall, and Stoke, were applying for powers at the same time. Mr. Pope, on that occasion, suggested that we had come at an inopportune time, and that there was no case for compulsory purchase; and the Committee, hearing this from such an authority, told us that our preamble was not proved, although in the summing up of the Chairman he stated that we had just grounds for bringing the Bill forward. I have considered the expenditure of capital by the Company during the period of their existence. In 1858 they came to Parliament for further powers to raise £30,000 at 7½ per cent. dividend. Down to 1875 they had only expended £10,919, so that in 17 years £10,900 or £11,000 had sufficed for all the growing wants of their district. I do not know what they are going to do with £75,000 in ten years. The size of Hanley is rather less than 1700 acres. The town has grown, undoubtedly, but it has not grown outside the limits of their mains. There is no necessity for provision to be made for such an increased supply as has been suggested by the engineers who have been down and examined the works for half a day. At any rate for the next ten years they will not require to raise more than £20,000, and this they might easily obtain on mortgage at 4½ or 5 per cent. The Corporation of Hanley can raise money at 4 per cent. I cannot understand the position of the Company from the accounts which have been published; they are incorrect as they have been furnished. On June 30, 1867, the capital account of the Company is stated in the balance-sheet to be £50,274, and the next year it is brought forward as £50,904, and yet they profess to have their accounts audited. I should like to remark that in the Norwich branch the audit is by the Corporation at the expense of the Company, and I do not see why the people at Hanley should be at a disadvantage in this respect, considering that the necessity for the audit has been well known for some years past. Some ten or twelve years ago it was notorious that one of the collectors absconded with a considerable sum of money—something like £800 to £1000—but such a thing could not have occurred if there had been an audit such as the Corporation of Hanley apply to all their accounts. With regard to the appointment of a gas analyst, we have asked the Company that the Gas-Works Clauses Act of 1871 should apply in the case of this Bill.

Mr. MICHAEL said that would be the case.

Witness: I beg your pardon. We have a letter from the Company stating that they decline, but if you give such an undertaking I will say no more about it. It is also a matter of common complaint that the streets are broken up without notice.

Mr. MICHAEL: They cannot be. The Corporation are entirely protected by the Gas-Works Clauses Act.

Examination resumed: With regard to the accounts of Longton and Burslem, they show a very considerable amount of profit over and above what the present Company are getting. According to the accounts before us, in 14 years the British Gas Company bought coals at a cost of £120,449, and realized a gross revenue from those coals of £307,507; that is, for every £1 spent in coals in Hanley £2·54 was realized. In Stoke in 11 years they spent in coals and purifying materials £28,730, and realized in revenue £117,867, or £4 2s. for every £1 spent.

In cross-examination by Mr. MICHAEL, witness pointed out other inaccuracies in the accounts similar to those he had mentioned, when

The CHAIRMAN (interrupting) said thay had better go on and leave the question of accounts.

Mr. *Corbet Woodall*, examined by Mr. GREENE.

I was till quite recently Engineer to the Phœnix Gas Company. I do not see any reason why the Corporation of Hanley should not manufacture gas quite as cheaply as the Company do. I think the advantage that would result from the Corporation management would be, in a well-managed concern, upon an increased business, rather than upon the business taken over from the Company. Illustrations in great number are furnished by the experience of those towns where transfers have been made. I am of opinion that the price charged in Hanley is higher than it need be under the management of the Corporation. We have had it in evidence that in the neighbouring towns the same price is charged, but also that the same price is not needed in those towns, inasmuch as they have a large balance after meeting the charges for interest upon the capital. I may state that in Hanley it appears to me there is an error in stating that the maximum dividends have not been earned, because they have been, though not under the name of dividends, because the item of 2 per cent. upon the cost of the works, for depreciation, is so much really added to the profits of the undertaking, taken out of the consumers. The total profits during the fourteen years since the passing of the Act of 1866 amount to £67,988, but in addition there has been taken £15,127 under this head of 2 per cent. for depreciation; so that the total is £83,115. The amount required to pay maximum dividends was £72,460; consequently they have earned an excess over maximum dividends of £9451.

Mr. MICHAEL (in cross-examination): You say that £8000 more has been earned than has been divided, but a total sum of £15,000 has been taken for a depreciation-fund, and used for capital purposes. If it had not been taken out of profits you must have raised capital at certain periods in order to make that expenditure, which would have borne a dividend of 7½ per cent., but which has been entirely saved to the consumers?

Witness: Surely it would be better to pay interest upon the £15,000 than to pay over the whole £15,000. They ought not to have shown a deficiency of dividend, inasmuch as the maintenance of the works is a charge fairly against the revenue, and they do not need to write off a special fund for depreciation.

Whether it is a special fund, or whether it is taken directly without the intervention of a special fund, what does it matter, if it comes to the same amount of money?—If it is out of revenue, they have to justify it as a fair charge on wear and tear; if it is out of capital, it is immoral—to use Mr. Stevenson's words—to charge the consumers not only with the cost of manufacture, but the making of new works.

Supposing instead of £1000 being taken and used for capital purposes, it had been divided among the Shareholders, that would have been £1000 more for the benefit of the Shareholders, and a loss to the consumers?—Yes.

Therefore it is the gas consumer who is benefited, and not the shareholder?—But surely there is some provision for the benefit of the gas consumer to prevent the division of the £1000 in that way. The shareholder has had the full amount of his dividend from year to year, and he cannot divide more. There is £11,000, in fact, appearing as a debt, which might just as well have been written off, because it was earned in the course of manufacture.

It was not divided among the Shareholders?—Evidence has been given that the Shareholders have never gone short of their full dividend.

So far as Hanley is concerned, they have never made their full dividends?—That seems to me to be one of the frightful anomalies of this Company, that if the profits have not been earned, yet they are divided.

How is Hanley interested in other funds which go to make up the full dividends, but which have not been derived from that town?—I think Hanley is vitally interested, because, if whether they earn the dividend or not they may divide it, it seems to me that there is no inducement to economy.

If some other property earns 5 per cent. in addition, what has that to do with Hanley?—Taking your view of it, if they are distinct, it seems to me one of the most monstrous things possible that it should be so.

Cross-examination continued: I am quite of opinion that gas could be supplied at Hanley for 2s. 7d., and leave a profit. I do not remember the amount of money earned per year per mile of main by the Phœnix Company, nor what it is in London altogether, but it is certainly larger in proportion to what it is at Hanley.

THURSDAY, JUNE 17.

Mr. *John Roody Cooke*, examined by Mr. BIDDER.

I am a Member of the Town Council of Hanley, and can speak to the general feeling and desire of the town in reference to the gas question. At the statutory meeting held previously to the Bill of 1877, after lengthy notice of the meeting, a resolution was all but unanimously passed in favour of going on with the Bill; and again, during the present proceedings, a petition was signed by upwards of 2000 of the principal ratepayers of the town in about two or three days. There is an all but unanimous feeling in the town in favour of the transfer to the Corporation. We have done all we could to endeavour to approach the Company upon friendly terms,—first in 1876; then when we prepared the Bill in 1877; and again in 1879 we tried to get them to listen to our friendly overtures. The Corporation have expressed their willingness to give the Company 25 years purchase of their maximum statutory dividend. Any complaints we make about the gas supply have to be sent to London, and we have found this extremely inconvenient.

Cross-examined by Mr. POPE: Supposing the Corporation had to borrow money to pay for the gas-works, they could raise it at 4 or 4½ per cent.

Mr. POPE: Say 4 per cent., and then you will have for 50 years to come to put by an extra 1 per cent. for your sinking-fund, making 5 per cent. What is the difference between that and the proprietors price?

Witness: The difference will be that at the end of that time the gas-works will be the property of the Corporation.

I suppose the Corporation would make contracts for coal beforehand?—I have no doubt they would.

And if the market went down then the consumers would say it was a bad bargain, while if the market went up they would say it was a good one?—Do not lose sight of the fact that the neighbouring municipalities have not made such bad contracts as the British Gaslight Company.

You know that, by the operation of the Gas-Works Clauses Act, if the Company make more than 10 per cent. you can compel them to reduce their price?—There is the fact that the only inducement of the Directors of the British Gas Company is to get their statutory dividend, whereas we should have an inducement to make a reduction in the price and also in the rates.

Cross-examination continued: We have made no complaints since 1877, but if we could do so as soon as difficulties occurred we should do so. There is a Manager at the works, but no official complaints have been made to him.

Mr. *James Moore*, examined by Mr. GREENE.

I am a Justice of the Peace for the Borough of Hanley, and a partner in a firm of earthenware manufacturers employing 900 hands. I have made complaints to the Manager of the gas-works about the quality of the gas, but they have not been met so promptly as they ought to have been, owing to the directorate being in London. We think our representatives on the Town Council would give more immediate attention to complaints than we can get through the London Board.

Cross-examined by Mr. POPE: The last complaint we made was in October, when we had not sufficient light. We had to send down two

or three times before finding the Manager, and were then told the Company would attend to it, which they did the next day but one, and the light was good after that time. I have no recollection of the Manager saying the defect was owing to a stoppage in our own fittings; I think it was in the pipes in the main road.

Mr. POPE read the report of the inspector, stating that the cause of complaint was water in one of the fittings.

Witness said he never knew such was the case; it was the first time he had heard of it.

Mr. *William Foster*, examined by Mr. BIDDER.

I am a Fellow of the Chemical Society, and also of the Institute of Chemistry, and have been for 2½ years Gas Examiner for the Metropolitan Board of Works. I went to Hanley on May 14 to ascertain the illuminating power and purity of the gas supplied there. The burner I found at the testing station corresponded in every respect to the steatite "London" Argand, but I did not at first notice that it was the burner in use. I made some observations, and recorded one of the illuminating power, and also commenced other observations with regard to the purity of the gas. Later on I had with me a standard burner as prescribed by the Company's Act and on asking for a similar one from the authorities at the station, I found there was not one. I went to the office a little before 5 o'clock in the afternoon, and was there during the greater part of the time between then and 12 at night. An observation with the steatite "London" burner about half-past 5 gave an illuminating power of 13·1 candles. Later on I used the parliamentary burner I had with me, and that also recorded 13·1 candles. At 9.30 I made another observation with the parliamentary burner, and obtained an illuminating power of 17 candles. I may here observe that I could not use the steatite Argand burner found at the station; the quality of the gas was such that it would not permit of its being tested by that burner. At 10.40 I again recorded the observations, which gave me a quality of 18·5 candles. I also tested the gas for sulphur, using the apparatus employed at the official testing-station of the Company, and known as the Gas Referees sulphur-testing apparatus. The quantity of gas consumed was 3·29 cubic feet, which is at the rate of ½ a cubic foot per hour, and I found 45·8 grains of sulphur per 100 feet of gas consumed, which is a large quantity relatively to what is found in the London gas at the present time, where it is limited to 20 grains per 100 feet. The Hanley Company's Act of 1866 also limits it to 20 grains. I made a determination of the ammonia impurity, not in the official testing-station of the Company, but in the offices of the Corporation, which are opposite the testing-station, and that resulted in 2·9 grains, the maximum allowed by the Company's Act being 5 grains.

Cross-examined by Mr. POPE: Every testing operation requires care and diligence. The Manager did not point out to me that the test with the burner I found there must be imperfect because the cone was left off. I do not know that I took anything off, or left anything off; I found the burner in use. It is not a common burner, but one of a very advanced type. The quantity of sulphur depends on the method of purification adopted in these small places. I did not try Burslem, nor Stoke, nor any of the other places around, and for anything I know it might have been worse in those districts.

Re-examined by Mr. BIDDER: Most of my experiments were made with the parliamentary burner, quite irrespective of whether I made any mistake with regard to the burner I found in use. I merely speak as to facts when I say the gas was much richer in the later part of the evening than it was in the earlier.

Mr. BIDDER: I suppose it was known you were there testing the gas?

Witness: Yes; and the officials were not favourable to my going into the station.

A MEMBER of the COMMITTEE: If their storeage does not extend to more than 24 hours, it occurs to me that it would be possible to make gas to reach a few thousand yards off in a few hours. Would a deficiency of storeage make the quality of the illuminating power vary much in a short interval?

Witness: I think not. If storeage is detrimental in a serious degree to the quality of the gas, there would be very bad gas in London, where it comes from Beckton, many miles off, and where it must be made some hours before it is consumed.

Mr. *Henry William Ackrill*, examined by Mr. GREENE.

I am Clerk to the Local Board of Tunstall, which is supplied with gas by the British Gaslight Company from the Brownhill works. The Tunstall Local Board would be glad to purchase those works if the Gas Company would sell them, and they are supported in their view by public opinion.

Cross-examined by Mr. POPE: We should object to being supplied by Hanley if the Corporation there obtained the works; and it is agreed that, if they buy, we should purchase our share.

A MEMBER of the COMMITTEE: You are a solicitor, and have a good acquaintance with the rudiments of justice. Do you think it a just thing for a public body to come and take, *vi et armis*, from private companies their property which they have held for a long time?

Witness: We should be glad to have it, but I do not say it would be just to take it if they do not wish to sell it.

Mr. *Ralph Hammersley*, examined by Mr. GREENE.

I am Chief Bailiff of Tunstall, and have been deputed to appear here to support the petition of the Hanley Corporation against this Bill. The population of Tunstall is between 13,000 and 14,000. At a meeting of the Local Board of Tunstall, on March 8, it was unanimously thought that if we could get the supply of gas into our own possession it would be much better for the consumers and the ratepayers, as we could supply ourselves much more economically, both individually and for the public service, inasmuch as since 1874 we have not participated in any reduction in the price of coals, which are now 40 or 50 per cent. cheaper than they were then, while we are paying the same for our public lights.

[The witness was not cross-examined.]

Mr. *George Turner*, examined by Mr. BIDDER.

I am the Mayor of Stoke, and for the last 40 years have taken a great interest in all matters connected with the welfare of that town. Up to a certain time Stoke was supplied from works belonging to the British Gaslight Company, but those works were acquired by the Stoke, Fenton, and Longton Gas Company, and subsequently by the Corporation, into whose hands they came about 20 months ago. We bought the undertaking upon a 25 years purchase of the maximum statutory dividends, which were all at 10 per cent. The amount more than represented the value of the Company, because it covered all they could possibly get out of it, and saved them from possibility of loss. The Corporation's management is much more economical than that of the Company, because we save in general expenses of management, directors fees, and so on, and I think we may put that down at £500 per annum. We raised the money for the purchase at 4½ per cent. Our first year's experience resulted in paying interest on the £87,000 which we borrowed—that was £85,000 for the purchase of the works, and £2000 to cover the expenses of the Act, &c.—and enabling us to put by a portion for the repayment——

Mr. POPE: That was 1 per cent., I suppose?

Witness: At present we have not decided what form we shall adopt. We are allowed four years from the passing of the Act before we decide whether we shall pay it by a sinking-fund, or by a repayment of principal and interest by annual payments. We have, however, decided that during these four years of grace we will reduce the amount by £2000, so that at the expiration of the time we shall simply have to meet the liability of the £85,000. We have also been able to divide between the authorities of Stoke and Fenton—the latter being joint purchasers with us—£3765 as clear profit. Of that amount Stoke participates to the extent of £2600, all of which has gone to the reduction of rates. We pay 7s. a ton for our coal.

Mr. POPE said it was not the same coal as was used at Hanley.

Witness: I would say, in reply, that the results of our coal are, I think, satisfactory. From 1876 to 1879 we had a contract at 7s. 6d. per ton, and when that expired we applied to different coal proprietors for a supply, and received many tenders for burgy, which is an unscreened coal used in many gas-works. The highest tender we received was 7s. 3d., I believe, whilst the Hanley Company were paying 11s. 3d. I have a weekly statement sent to me of the make of gas and the results per ton of coal. The make for the week ending June 5 last was 9810 feet per ton, and for the week ending June 12, 9900 feet. The make at Hanley was 9300 feet, so we get from 500 to 600 feet more gas per ton of coal. When the Stoke Corporation took the matter in hand, they found that other gas-works were realizing better results, and they insisted upon it that better results should be realized there, and the return for the last year by the Manager showed that the make of gas averaged 9800 feet. We obtain 6s. a ton for our coke, and when I was at the works last week there was not a ton of it for sale. During the year 1879 I do not think it averaged 6s., but I do not think we sold any for less than 5s. This shows that the Hanley Company were losing a revenue of 2s. 3d. a ton as compared with what we were realizing upon our coke. In 1879 our coal cost £3383 10s. 10d., and our residual products realized £3161 1s. 1d., or within £220 of the actual cost of the coal.

Mr. BIDDER: I see by the Hanley accounts for 1879 that they paid £10,000 odd for their coals, and only realized £4458—or less than half—for their residual products?

Witness: I do not know anything about that, but I can only say if it was the case at Stoke we should speedily alter it.

Cross-examined by Mr. POPE: We purchased the gas-works at Stoke by agreement.

Mr. POPE: I understand that your gas profits go in reduction of the general rates—that is, you put your hands into the pockets of the gas consumers to relieve the general ratepayers?

Witness: I should say that we do a general good instead of doing a partial good.

But so far as the consumers and ratepayers are not the same people, you relieve the one at the expense of the other?—But they are the same people, in some degree.

Mr. *Thomas Hulme*, examined by Mr. GREENE.

I am a Member of the Town Council of the Borough of Burslem, and have been twice Mayor. I am also Vice-Chairman of the Gas Committee of Burslem, the population of which is about 30,000. Up to 1877 the supply of gas was in the hands of the Burslem and Tunstall Gas Company, which had previously purchased the right of the British Gas Company. The capital of the Burslem Company was £36,000; the illuminating power of the gas was the same as that supplied to Hanley and Tunstall, and the price was also 3s. 6d. per 1000. The Burslem Company were likewise paying their statutory dividends of 10 and 7½ per cent. Since the Corporation have taken the works the result has been very satisfactory. We have not reduced the price of gas, but we have reduced the public rates; at least the Council have accepted an offer to light for the whole year, instead of ten months. We have also increased the illuminating power of the gas, which is now 16 candles instead of 14, and the sum of £3700 has been handed over to the fund in aid of the rates during the last two years. We have also applied £3918 to the formation of a working capital. I cannot see any necessity for the large increase of capital asked for by the British Gas Company; we work ours with a very trifling capital at the present time. The former Company had £36,000, and the £80,000 which now forms our capital went into the pockets of the Gas Company.

Cross-examined by Mr. POPE: I am aware that, so far as power to purchase by agreement is concerned, the Local Government Act of 1865 gives all that power.

Mr. POPE: Purchase by agreement is one thing, but putting your hand upon a man's property and compelling him to sell is another.

Witness: Certainly.

By the COMMITTEE: We have considered the propriety of reducing the price of gas to the consumers, but we consider that until we get sufficient capital the gas consumers ought to be content. Last year we gave £2000 in aid of reducing the rates, which was equal to reducing the price of gas to 2s. 11d. The works are owned by the public, and whatever profits are made it is, of course, proper that the public should reap the benefit of them.

Mr. *Matthew Folliott Blakiston*, examined by Mr. BIDDER.

I am at the present time a Solicitor at Stafford, but until 1873 I was Town Clerk of Hanley. In my judgment it is expedient and desirable that the gas-works at Hanley should be in the hands of the Corporation. From my experience at Stafford I should anticipate better results at Hanley than even at Stafford, because the latter was a local company. In 1866 the Corporation of Stafford obtained an Act with compulsory powers for the purchase of the Gas Company without any previous arrangement with them, and those powers were put in force. The Act gave us power to purchase compulsorily at any time within seven years, upon giving notice to the Company of our intention to do so. The price was to be determined by arbitration under the Railways Clauses Act, which is different from the Lands Clauses Act. We did not exercise the power at once, having a good many things in hand, but the Gas Company gave notice of an application to the Board of Trade to sanction the issue of £15,000 more capital. We knew, if this capital were authorized, we should have to buy it back at a premium, and the Corporation then decided to purchase the works, and served the necessary notices. No agreement was arrived at, and the matter went to arbitration, when an award was made, which has been in operation for over two years. It appears to me that, having regard to the utterly unequal position of the Hanley Company, if the Committee should pass this Bill, it should be subject to more stringent conditions, for it practically takes away from the Corporation the chance of acquiring this property. The great mass of our loan in Stafford was raised locally, and we pay 4 per cent. net, which is equal to about £4 1s. Supposing Hanley to be able to do the same on similar terms, the application to raise £75,000 at 5 per cent. is, in effect, mulcting the consumers of that town to the extent of 1 per cent. If the Corporation should hereafter obtain powers to make terms for the purchase of the works, they would have to buy back the whole of this capital, whether it had been raised or not, because shareholders always contend for prospective profits.

Mr. BIDDER: If the Committee sanction the £75,000 capital, and the works were bought the next day, the very fact of the capital having been sanctioned, though not a penny had been issued, would be the foundation of a substantial claim for compensation?

Witness: For about £18,000.

Examination continued: Stafford has been exceptionally fortunate as regards management, which has been local, and very economical. It is essentially the case, in a place like the Potteries, that consumers and ratepayers are identical. Of course, ratepayers are consumers in respect of the large consumption of gas in the public lamps, and the small ratepayers are consumers because there is a large consumption in manufactories, and in many places they are actually charged for the gas they use. If they do not burn it in their own homes, they burn it necessarily in the occupations they carry on in the town.

Mr. BIDDER: Carrying it a step farther, if they were not identical, in point of fact the money you are able to apply in the reduction of rates is partly acquired by being able to raise money at a low rate of interest upon the security of the rates, and, therefore, the surplus is justly applicable to the relief of the ratepayers?

Witness: I cannot at all agree with Mr. Stevenson that we are acting immorally in so doing.

Will you point out in what respect economy would be possible in Hanley by the Corporation taking over the gas-works?—I think in every respect. The Corporation have no directors fees to pay to any officials, because there must necessarily be a staff of engineers, accountants, and clerks, all of which can be brought to bear upon the gas department, which would then be worked as a branch. The rates can also be collected by the people who collect the district rates with a very slightly increased payment; and in a district like Hanley there would be a very great economy in respect of the direct supervision of the Council and the ratepayers. There is also the advantage that when the Corporation have control of the gas they are more liberal with public lights; they do not think about the cost as if they had to pay so much for each light. There is likewise a manifest advantage in regard to the streets, because when the pipes are in the hands of one authority, who have charge of gas, water, and sewers, they take care to have as little destruction of the streets as possible. If the additional capital proposed is not absorbed for many years to come, the effect will be to keep the Company out of Parliament all that time, and the Hanley people would not have the advantage of obtaining concessions from them.

Cross-examined by Mr. POPE: A compulsory power of purchase was inserted in our Improvement Bill, and the Gas Company seeing it there, did not even petition against it. They could see that the Corporation had better have the works, and they did not think it worth while to contest the matter, but said they would take a clause that would give them full compensation.

This concluded the case for the opponents of the Bill.

Mr. POPE, in replying upon the whole case, said he had never known an instance of a gas or water company applying to Parliament for increased powers, in which the local authority of the district had not interfered and said they were the parties who ought to take the supply of those useful articles. If they were dealing with a case in the first instance, it might be worth while for Parliament to consider whether the public authorities were not the parties who ought to assume such responsibilities; but it was curious to observe that they were only anxious to take possession of the works so soon as they became profitable. This, however, was what Parliament had hitherto strenuously resisted; and, unless the tone of public legislation had changed, it had been held that it was not a sufficient justification to deprive private owners of their property compulsorily, simply because the local authorities wanted to obtain it; otherwise Parliament would not have applied to gas and water companies the same law which the Lands Clauses Act of 1845 applied to land required for public purposes. But, beyond that, the opinion of Parliament had, in 1875, been deliberately expressed, that local authorities should have the power to construct works or to purchase existing gas and water works, only if they could agree with the owners of the property; and Parliament had refused to clothe the authorities with the power of seizing such property simply because they thought it would be better administered by themselves. With the exception of two cases—the Stockton and Middlesbrough Water and the Birmingham Water Bills—not a single instance could be found in which Parliament had sanctioned the seizure of such works by a public authority against the will of the company.

The CHAIRMAN said he thought Rotherham was a case in point.

Mr. POPE said it sometimes happened, when Committees were much impressed with the importance of a case, they told the parties that if they did not agree certain powers would be given, and this was the case at Rotherham. If a public body obtained power to become traders, and to make a profit on gas, and then applied that profit to the general rates, they were, in point of fact, taxing the gas consumers for the benefit of the general ratepayers. In small communities, such as Stafford and Hanley, that inequality would not, perhaps, exist to a very large extent, but it did in other places. The proper principle was that included in the Gas-Works Clauses Act—to which all other gas companies were amenable—by which provision was made for giving the benefit to the consumer instead of to the general ratepayer. If the Company made more than the 5 per cent. which they asked for on their capital, it must go in the reduction of the price of gas, and machinery was provided for that purpose. It was not pretended that there might not be some slight economy in the management of gas-works by the Corporation, because the Town Clerk was the law adviser of the Corporation, and that would save separate legal expenses in connection with the gas-works. It might also be that there were no directors fees to be paid; but, after all, what a paltry sum was the £300 or £400 which might be spent in expenses of that kind. Was there any justification for the Committee deciding that the gentlemen from Hanley should say to the Gas Company—who, with greater or less efficiency, had faithfully done their duty, and with fewer complaints than were generally met with in cases of this kind—"We will lay our hands on your property and goods; our Town Clerk and our collectors will do the work that your collectors are doing; and we will compel you to sell the property which you do not wish to part with"? That was a monstrous doctrine. Of course, if there were a great public necessity—if they found the Gas Company flagrantly deficient in their duty, if they found that the Corporation of Hanley had tried to put into operation the powers given by the Gas-Works Clauses Act to ensure pure gas and sufficiency of pressure—if they found the legislation of the country to be insufficient to protect the Hanley people—then the Committee might say they would have to resort to an extreme remedy; but the Hanley Corporation had not even attempted to employ those powers; they simply asked the Committee to reverse the decision of 1877 without any fresh cause. The Company did not ask the Committee for power to raise additional capital, because they could do that themselves, but they asked authority to apply further capital to the development of their gas undertaking in the Potteries. They also asked the Committee to limit them to a profit of 5 per cent. upon the capital so employed, and surely this was a modest request. Supposing the new capital had to be submitted to public competition, it was only necessary to look at the share list of *The Times* to see that 5 per cent. or thereabouts was the public valuation of gas capital. In the Stockton case Parliament took care that not only should a large sum be paid by the body that took possession—viz., 25 years purchase, which was equal to a 4 per cent. security—but it was also provided that they should pay for prospective profits of the Company, which amounted to £286,000. If the promoters were asking 7 per cent. on the new capital, the opposition would be reasonable, but they were only asking 5 per cent. If the Corporation bought the Company, they would have to pay 4¼ per cent. for the money; and the Act of Parliament provided that they must form a sinking-fund to provide for its repayment, which would take 1 per cent. more, and the only difference, therefore, would be that in 50 years the gas-works would belong to the Corporation. Committees generally took care to sanction the raising of as much capital as would secure a company coming to Parliament to be overhauled in ten or twelve years; and if they thought the amount proposed was more than ought to be allowed, let them cut it down to what they considered right.

The committee-room was then cleared. On the counsel and parties being re-admitted,

The CHAIRMAN said the Committee were of opinion that the preamble of the Bill was proved; but they considered the proposed additional capital to be excessive, although they were willing to allow such an amount as would enable the Company to carry on their undertaking for ten years.

Mr. GREENE said, under these circumstances, the opponents of the Bill would not appear further before the Committee.

The clauses were then proceeded with. On clause 14,

Mr. *Penny* was recalled, and, in answer to the CHAIRMAN, said the Company must have a new tank and gasholder, which would cost £10,000; a new retort-house, £6000; land, £2000; and condensers, purifiers, governors, and exhausters would make up £30,000, which would be required to be spent immediately. He thought £50,000 would be a fair sum to grant, which would be £20,000 beyond the items he had mentioned.

The clause was amended accordingly.

The remaining clauses were then read and agreed to, and the Chairman was directed to report the Bill, as amended, to the House.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

TUESDAY, JUNE 29.

(*Before the* MASTER OF THE ROLLS.)

ISLE OF THANET GAS COMPANY *v.* DAVIS.—DAVIS *v.* ISLE OF THANET GAS COMPANY.

These cases—which were before the Court several times last year, on motions by each side to restrain the proceedings of the other party—now came on for a final determination of the rights of the parties.

Mr. CHITTY, Q.C., and Mr. CHAPMAN BARBER appeared for the Company; Mr. BAGSHAWE, Q.C., and Mr. E. CUTLER for Mr. Davis.

Mr. CHITTY, in opening the case for the plaintiffs in the first action (the Gas Company), said the question at issue really depended on the construction of an Act of Parliament passed in the reign of Geo. IV., and the matter to be decided was whether the Company were or were not authorized by this Act to carry their pipes along the public high road at a particular spot, the soil of which belonged to Mr. Davis, who objected apparently because he wanted to have private gas-works of his own.

The MASTER of the ROLLS said this was not the whole of the question. Why were there two actions?

Mr. CHITTY said Mr. Davis brought his action and moved for an injunction to restrain the Company from carrying their pipes through his land; but his friend Mr. Bagshawe had not the courage to face the question of construction on the motion, and saved the motion until the trial.

Mr. BAGSHAWE said it was not for want of courage. The reason he allowed the motion to stand over was a very good one—viz., that the Company had gone through Mr. Davis's land; done all the mischief they could; and he had pulled up the pipes. Then the Gas Company brought their action to make him allow them to put them down again.

Mr. CHITTY then produced a map of the *locus in quo*, stating that Mr. Davis, as owner of the soil, claimed to intercept the laying of the pipes, on the ground that the Company had no parliamentary powers there.

The MASTER of the ROLLS: It is a simple question whether you have or have not?

Mr. CHITTY said this was so. The Act he had referred to was entitled "An Act for lighting with gas the towns or villages of Margate, Ramsgate, and Broadstairs, *and places adjacent*, in the county of Kent."

The MASTER of the ROLLS said he remembered having to consider the words "and places adjacent" on the motion, and sending for some dictionaries. The question was by no means on the surface, and it was not always easy to construe the wording of an Act of Parliament. It was worse than a will generally, if there was any difference. He presumed the Company claimed a monopoly of supply, and so their Act must be construed strictly.

Mr. CHITTY said they were not claiming any monopoly. Parliament did not grant exclusive rights in these cases; but, as a rule, it did not grant powers to any second party, unless the first did not do its duty. He might mention that this matter had been before a Parliamentary Committee, and they decided that the Company had *locus standi* to oppose the Bill promoted by Mr. Davis, which was in effect a decision that their limits were as wide as they contended for.

The MASTER of the ROLLS, who had been looking at the shorthand notes of his judgment on the motion, said he seemed to have taken a different view; but on these questions of construction there was no right and wrong. It was simply the view taken by the judge; one judge took one view, and another another. There was no value in it, except to the man who won, as the French said.

Mr. CHITTY suggested that it was an Act which probably his Lordship would agree ought to be construed beneficially.

The MASTER of the ROLLS said it must be construed fairly. On the one hand it might be said it was an interference with private property; and on the other that it was for the public benefit. They must set off one against the other.

Mr. CHITTY said there was no interference here except with that which Parliament did not seem to think much of, viz., the right of going along the public high road. If the Company were within their limits, Parliament said landowners must suffer this trifling wrong. The motives of Mr. Davis, of course, were not material.

The MASTER of the ROLLS said the motive was quite immaterial. The only question was whether the Company had a right or not.

Mr. CHITTY said he supposed he had a right to read the title of the Act for the purpose of construction.

Mr. BAGSHAWE said it did not matter, because exactly the same words were used in the preamble.

Mr. CHITTY said the House of Lords had now decided that the marginal notes could not be referred to.

Considerable discussion ensued on this point, in the course of which

The MASTER of the ROLLS remarked that the rule had probably been

laid down in ignorance of the historical facts. Formerly judges had power to send for the original roll of Parliament in case of doubt, on which roll no marginal notes appeared, and consequently they were not part of the Act; but since the Act which made a Queen's Printer's copy evidence, that practice was gone; and Parliament had also changed its practice, and instead of a manuscript roll, had a printed roll from the same printers, on which marginal notes did appear, and they would therefore seem to be as much part of the Act as anything else. At the same time he agreed that the rule was practically a good one, because the marginal notes were often carelessly prepared, and were sometimes left in their original state after the clauses to which they referred had been altered. Strictly speaking, he should say he ought to be able to look at the notes, but he should not attach any value to them.

Mr. CHITTY then read the preamble of the Act, which commenced thus: "Whereas the towns or villages of Margate, Ramsgate, and Broadstairs, and places adjacent, in the Isle of Thanet, in the county of Kent, are populous, and the lighting the streets and public roads, ways, passages, lanes, and places therein, and the suburbs and vicinity thereof, with gas, would be of advantage to the inhabitants thereof, and to the public at large"——

The MASTER of the ROLLS, interrupting, said the whole question was what was "adjacent." It must be some populous place, at all events.

Mr. CHITTY submitted that the populous places were Margate, Ramsgate, and Broadstairs, not the places adjacent.

The MASTER of the ROLLS asked how far the place in question was from any one of these places.

Mr. CHITTY said it was nearest to Margate. He would hand up an Ordnance map which was on the scale of 1 inch to a mile, by which it appeared to be about 1½ or 2 miles.

The MASTER of the ROLLS said it looked farther away than this.

Mr. BARBER said it was about ¾-mile from Westgate-on-Sea.

The MASTER of the ROLLS said the question was how far it was from Margate at the time the Act was passed.

Mr. BAGSHAWE then produced a survey made in 1821 by a Mr. Wm. Edmonds, and published at the time, showing the point to which Margate extended. It was not, he said, strictly in evidence, and he did not know whether it could be looked at.

Mr. CHITTY said he had no objection to the map being looked at, and he then handed up to his Lordship a map with the exact spot marked upon it.

The MASTER of the ROLLS said it was 3 miles from the houses, as near as could be.

Mr. CHITTY thought it was about 2½ miles.

The MASTER of the ROLLS said it was more than that.

Mr. CHITTY said he was measuring as the crow flies; perhaps his Lordship measured along the road.

The MASTER of the ROLLS: Yes; as the crow flies it would be about 2½ miles.

Mr. CHITTY said at the end of the section there were these words: "For the purpose of supplying the said towns of Margate, Ramsgate, Broadstairs, and the suburbs thereof, and parts and places adjacent."

The MASTER of the ROLLS: What does "adjacent" mean? Lying near. The question is how near.

Mr. CHITTY reminded his Lordship that in a previous case where he had to consider the meaning of the word "adjoining" he held that "adjoining" meant touching. "Adjoining" meant touching, but "adjacent" meant lying near. The prefix "ad" must be used so as to express contiguity. So it was laid down in the dictionaries.

The MASTER of the ROLLS said his opinion in the case mentioned was that adjacent and adjoining meant the same thing; but this was only his view of that particular case. It was quite plain it did not mean the whole Isle of Thanet, or it would have said so. The power was only to supply the houses within the said towns or villages, or the suburbs or vicinity thereof, or parts adjacent.

Mr. CHITTY submitted that this meant the parts adjacent to the suburbs. There was no reason why in this Act the words should not have a legal construction.

The MASTER of the ROLLS then referred to the "Imperial Dictionary," from which it appeared that "adjacent" meant lying near or close. This was 2½ or 3 miles off. He did not think it meant 3 miles out in the country. He did not mean to say that somebody else might not be of an opposite opinion, but he did not think it meant 3 miles off by the road, or 2½ miles as the crow flies.

Mr. BAGSHAWE said if it did it must include the whole Isle of Thanet. Every dictionary he had seen gave the same meaning—lying near to or close.

Mr. CHITTY said this place lay near the vicinity.

The MASTER of the ROLLS said it was 2½ miles as the crow flies, and 3 miles out of town by the road at the time the Act was passed.

Mr. CHITTY said the Act was passed for the purpose of supplying the inhabitants with gas.

The MASTER of the ROLLS said the Company at that time never dreamt of supplying this place. They meant the towns and villages, not people in the country or lone farmhouses. At that time this place was out in the middle of the country.

Mr. CHITTY said there was a section of the Act which said the Company might erect six stations. Why should they erect six stations for Ramsgate, Margate, and Broadstairs?

The MASTER of the ROLLS said he did not know; but, as he understood, this place was then out in the country.

Mr. CHITTY said that Birchington was a village on the London road.

The MASTER of the ROLLS said Birchington was not mentioned in the Act—the villages named were Margate, Ramsgate, Broadstairs, and therefore Birchington could not be considered. He should say that an independent village was not to be included. He was of opinion, though the Court of Appeal might take an opposite view, that "places adjacent" did not mean 2½ miles out in the country, with probably not even a lone farmhouse there. He could only give his opinion.

Mr. BAGSHAWE said he supposed this judgment would carry the costs of both actions, including the motions.

The MASTER of the ROLLS said yes. In his opinion the place in dispute was not adjacent.

Mr. CHITTY said he took it that his Lordship only decided with reference to the *locus in quo*—nothing else.

The MASTER of the ROLLS said no—nothing else. The place was out in the open country at the time the Act was passed, and was not "adjacent" to Margate, which was the nearest place.

Mr. BAGSHAWE said he presumed the injunction would be discharged, and Mr. Davis would be at liberty to take up the pipes.

The MASTER of the ROLLS said yes. He did not decide anything as to any other place. There might be other consumers as regarded other places.

Mr. BAGSHAWE said, subject to an appeal, they would take the pipes away.

The MASTER of the ROLLS said it was a mere question of opinion on the meaning of the term "adjacent."

Mr. BAGSHAWE remarked that the operation of taking away charged gas-pipes was rather difficult.

The MASTER of the ROLLS, addressing Mr. Chitty, said: If you do not appeal you must take them away.

Mr. CHITTY afterwards produced "Worcester's Dictionary" to show that what is "adjacent" may be "separated by the intervention of some other object."

The MASTER of the ROLLS said "Worcester's Dictionary" was not a high authority. The use of language in America was more liberal, and he did not, for this reason, like quoting American dictionaries, especially on legal questions.

Mr. CHITTY said that in America they often preserved English words which had fallen out of use, and the late Mr. John Forster, who was a high authority on such questions, recommended this dictionary to him as a very good one.

The MASTER of the ROLLS said in America they were very lax in interpretation, the reason being that they had not one capital as we have in England.

Judgment accordingly.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

The Chief Gas Examiner for the Metropolis (Dr. Williamson, F.R.S.) has just presented his report on the examinations of the gas supplied by The Gaslight and Coke, Commercial, and South Metropolitan Gas Companies, during the quarter ending the 30th of June:—

I. *As regards Illuminating Power.*—The following is the average for the quarter at each of the testing-stations, in standard sperm candles:—

The Gaslight and Coke Company—	
Beckton (common gas)	17·4
Friendly Place ,,	16·8
Millbank Street (cannel gas)	21·2
Ladbroke Grove (common gas)	17·2
Devon's Road ,,	17·2
Carlyle Square ,,	16·7
Camden Street ,,	17·0
Graham Road ,,	17·0
Commercial Gas Company—	
Parnell Road (common gas)	17·0
Wellclose Square ,,	16·8
South Metropolitan Gas Company—	
Hill Street, S.E. (common gas)	16·8

From these results it will be seen that with regard to illuminating power the average for the quarter has been at all the stations of the three Companies above the requirements of the Acts of Parliament, more especially at the Beckton, Millbank Street, Ladbroke Grove, Devon's Road, Camden Street, and Graham Road stations of The Gaslight and Coke Company, and the Parnell Road station of the Commercial Company.

II. *As regards Purity.*—Sulphuretted hydrogen has not been present in the gas at any of the stations. The average proportions of sulphur in other forms than this were as follows:—

Grains of Sulphur per 100 Cubic Feet of Gas.

The Gaslight and Coke Company—	
Beckton	10·6
Friendly Place	8·0
Millbank Street	10·3
Ladbroke Grove	10·2
Devon's Road	10·0
Carlyle Square	14·5
Camden Street	11·3
Graham Road	12·2
Commercial Gas Company—	
Parnell Road	9·8
Wellclose Square	9·6
South Metropolitan Gas Company—	
Hill Street, S.E.	11·8

The maximum amount of sulphur found in the gas manufactured by the three Companies has, at all their respective stations, been below the limits allowed, and the average for the quarter has in each case been very considerably below those limits, especially at the Friendly Place, Millbank Street, and Ladbroke Grove stations of The Gaslight and Coke Company, and the two stations of the Commercial Company.

At the Beckton and Camden Street stations of The Gaslight and Coke Company ammonia has not been present in the gas. At the Devon's Road and Graham Road stations of the same Company it has appeared rarely. At the other stations of the three Companies it has been present in small quantities. The average in each case has been far below the maximum allowed by the Acts.

THE NOTTINGHAM CORPORATION GAS-WORKS.

In the course of the past month a formal visit was made by the Corporation of Nottingham to the whole of the gas-works supplying the borough, and the other property connected therewith. The Mayor (Sir James Oldknow) was one of the party, which was conducted by the Engineer (Mr. M. Ogle Tarbotton); while Alderman Thackeray, the Chairman of the Gas Committee, and Mr. John Wilson, the General Manager of the Gas Department were also present.

It may be remembered that the works were bought in 1874 from the old Gas Company, and have since been managed by a Committee of the Corporation. The price of gas has in the six years been three times reduced; the charge now being only 2s. 10d. per 1000 feet to small consumers.

Previous to the visit a very interesting report, prepared by Mr. Tarbotton, was placed in the hands of each member of the Town Council, and to this we are indebted for the particulars we now give of the various departments of the gas undertaking.

The first place visited was the Giltbrook Chemical Works, established for the purpose of dealing with and manipulating the ammoniacal liquor and tar. The liquor produced at the three manufacturing stations (Eastcroft, Radford, and Basford), and which now amounts to nearly 2 million gallons in the course of twelve months, is conveyed by boats to the works at Giltbrook, and converted into commercial sulphate of ammonia. The tar also, from the several manufacturing stations, is conveyed by boat or rail to Giltbrook, and distilled into secondary and other products, some of which are transported into other localities, principally on the Continent. The pitch is used for local purposes and for the formation of artificial fuel, for which the bulk is shipped to the Continent. The sulphate of ammonia manufacture was formerly conducted at small works at Poplar, in Nottingham; but, in consequence of the nuisance which was created, the works at Giltbrook were established by the late Company. The tar works were also carried on by the Company on a small scale at Awsworth. Since the transfer of the gas undertaking to the Corporation, however, the present consolidated works at Giltbrook have been built. In 1878 the Corporation applied to Parliament for powers to establish the works, and during the years 1878-79 they were

erected, and consist of a complete manufactory for the chemical treatment of ammoniacal liquor and tar. The old works at Awsworth have subsequently been abolished. The works embrace canal wharves, railway sidings, offices, tanks and reservoirs, stills, condensers, purifiers, scrubbers, exhausters, engines, boilers and pumps, separating and storeage tanks, saturators, mixers, presses, and other like machinery; also special stills for anthracine and a commodious pitch bay. The works are now in full operation, and are leased by the Corporation for a term of years expiring in January, 1883. Most of the tar and liquor is purchased by the lessee, under his contract with the Corporation, and removed to Giltbrook, where the various processes are conducted throughout the year, fairly free from smell or local nuisance.

The Basford Gas-Works, next visited, are comparatively new, and occupy a portion of a piece of land, dedicated by Act of Parliament to gas manufacture, consisting of upwards of 23 acres. The existing works will, in course of time, be triplicated in extent. The present carbonizing power consists of 512 retorts, with all the necessary condensers, purifiers, exhausters, gasholders, steam and other engines, machinery, and apparatus. At these works about 2¼ millions of cubic feet of gas can be produced daily. The property embraces a large house (occupied by the Vicar of Basford), shortly to be converted into offices, also superintendents and other houses, and the ordinary adjuncts of a complete gas manufacturing station. Since the transfer of the gas-works to the Corporation, a large new holder has been built at these works, on the east side of the Midland Railway, also a large liquor-tank, waggon sheds, lodge, offices, and boundary walls. Pumps and mains have been put down for conveying the ammoniacal liquor to Wollaton Wharf (about 2¼ miles distant) in order to save the expense and nuisance of carting the same through the streets. This establishment will shortly have to be enlarged to meet the rapid increase in the consumption of gas throughout the district.

The party then proceeded to the Radford Gas-Works, which originally covered a little over 4½ acres, but in the parliamentary session of 1879 the area was extended, by about 2 acres, for the purposes of general enlargement. Practically the Radford works are entirely new, for since the transfer of the gas undertaking to the Corporation they have been (with the exception of the shell of the old retort-house, and the entrance and offices) reconstructed. The works now in progress consist of a carbonizing-house, purifying-house, meter and governor house, coal-sheds, liquor and tar tanks, condensers, purifiers, large gasholder, washers, and general gas apparatus. The additions and alterations made in 1876 consisted of four new telescopic gasholders, new retort-benches, chimney, hydraulic main and ascension-pipes, condensers, coal-sheds, exhauster, engine and boiler house, and machinery; with tar, water, and ammonia tanks. The River Leen has also been partially covered over. The new and entire carbonizing power of these works will approach 2 millions of cubic feet of gas per diem. The number of retorts is 378. The new holder will be 160 feet in diameter, and will be capable of containing nearly 1¼ million cubic feet of gas; the total storeage at these works being about 1⅝ million cubic feet.

The area covered by the Eastcroft works is a little over 7 acres, and the land is fully utilized. The buildings consist of four retort-houses, coal-sheds, two purifying-houses, two meter-houses, engine-house, superintendents houses, general offices, stables, &c. The works comprise 515 retorts, six holders, and all the usual and modern appliances and apparatus for gas manufacture; and although the oldest works of the late Company, they are in excellent working condition. The carbonizing power is equal to about 2½ million cubic feet of gas per diem. Since the transfer of the works to the Corporation, a new large tank and telescopic gasholder have been constructed at the works; also two new coal-sheds, four new purifiers, stables, offices, tar-gauging tanks, and boilers have been provided and brought into use.

The estimated length of mains laid throughout the district is about 200 miles, and a new large main is now being laid from the Basford works to Wilford Road, Nottingham, passing through the works in course of extension at Radford. This main is 2 feet 6 inches in diameter for some distance, and 1 foot 6 inches beyond, and is required to provide for the increasing consumption of gas in the Leen Valley, and to regulate the discharge of gas from the several stations.

In 1878 the Corporation purchased a piece of land at Eastwood, consisting of about 11 acres, and afterwards obtained parliamentary powers to apply the land for the purpose of gas manufacture. The land is bounded by the Great Northern Railway, the Nottingham Canal, and the highway leading from Eastwood to Heanor; and thus is an admirable site for new gas-works, which at probably no very distant time will be required for the neighbourhood.

The present producing power of all the works, when the Radford extensions are completed, may be taken at from 6 to 6½ million cubic feet per day. The largest daily consumption during last winter was nearly 5½ million cubic feet; while the total consumption during last year was nearly 1000 million cubic feet. The consumption of gas is increasing at the rate of from 7 to 8 per cent. per annum; so that if this increase continues, the works will require to be duplicated every ten years. The present number of consumers meters is nearly 32,000. The parliamentary district of the Corporation Gas-Works contains 85,361 acres, or nearly 134 square miles, and embraces 41 towns or parishes, with an aggregate population of about 220,000. The average illuminating power of the gas supplied is equal to about 17½ sperm candles in the district generally; and is, of course, rather higher at the works.

VISIT TO THE CHELSEA WATER COMPANY'S WORKS.

On Saturday, the 26th ult., the half-yearly inspection of the works of the above-named Company was made by the Governor (Mr. John Deedes), the Deputy-Governor (Sir W. H. Wyatt), and the Directors (Messrs. W. H. Yatman, W. H. Child, W. P. Bodkin, F. S. Clayton, R. W. Monro, J. S. Wigg, and Colonel Sir Wilford Brett), aided by the Secretary (Mr. Albert Gill), the Engineers (Messrs. Simpson and Lea), and Messrs. G. H. Gill, W. H. Turner, and G. Lott. About 70 invitations were accepted.

The party assembled shortly before midday at the Waterloo Station, and proceeded thence by train to the works at West Molesey, where the subsidence reservoirs (covering about 40 acres of ground, the works here occupying altogether about 60 acres), and the machinery were inspected. Luncheon was afterwards served in a tent on the grounds. Mr. DEEDES occupied the chair.

The usual loyal toasts having been drunk,

Sir W. H. WYATT proposed, "Well-doing and success to the Water Companies which supply the Metropolis." They were, he said, favoured more or less with representatives from all the different Companies, and it was gratifying to see them on this occasion. As they had been engaged in a common fight for their existence, they had had to meet much more frequently during the past few months, and had been enabled to see how thoroughly the property of the Companies and the interests of the Proprietors were looked after. Secondarily, but not much secondarily, they considered the interests of the ratepayers. He coupled the toast with the name of Mr. John Miles, the Governor of the New River Company.

The toast having been drunk,

Mr. MILES said they had had great pleasure in seeing the Company's works, which were carried on with so much benefit to the ratepayers, who had not been called on to contribute to their cost. All present were aware of what was going on in connection with the Metropolitan Water Companies, and he thought it would be wiser to say nothing, but await the issue. The Thames supply had been improved by all the works, and he was sure that the chemical gentlemen present would back him up when he stated that they had nothing to fear from that supply.

The CHAIRMAN, in proposing the next toast, said they had been honoured with the presence of four gentlemen who, he believed, were Medical Officers of Boards of Health—Dr. Tidy, Dr. Frankland, Dr. Dudfield, and Dr. Collier, and he thought the Company showed some courage in submitting their works, at the present critical moment, to the inspection of gentlemen of such eminence. They felt, however, that they could do so, and that the verdict of those gentlemen would be in favour of the Company. At the present moment the eyes of many were turned on the proceedings of the London Water Companies, but he hoped that they had succeeded in keeping their house in order. He asked them to drink the health of the gentlemen he had mentioned.

The toast having been duly honoured,

Dr. FRANKLAND, in returning thanks, said he did so not as a Medical Officer of Health, but as a Chemist. He occupied a very critical position, and one which it was difficult to fill with any sort of credit, for if he complained of the water supplied to the Metropolis, the public were only made uncomfortable about it, and did not thank him, while the Companies took rather a hostile view of his reports. On several occasions he had had to comment on the quality of the London Water Supply, more especially that part of it taken from the Thames, and he thought that on one or two occasions he had had to speak rather severely as to the Chelsea Company's supply. The Chelsea Company had worked under very great difficulty for a long series of years, and until they acquired the land where they were then assembled, upon which to develop their purifying processes, it was quite impossible for them at all times of the year to deliver water satisfactory to the consumers; but he must say that there was no one of the Companies delivering water in London, either from the Thames or elsewhere, who had done more to improve the supply than the Chelsea Company. At the present moment the Company stood pre-eminent for the quality of the supply which they delivered from the Thames. He would not say a word about the quality of the Thames water itself—that was a matter about which the Companies who had been deputed, he might say, by Parliament to supply water to London had very little to do. At enormous expense they had removed their intakes from an objectionable part of the Thames to at all events a far less objectionable part, and he must say that of late years—though, of course, as a chemist he could not say that they had done everything which was possible—they had done all that was reasonably within their power to improve the supply. Although as a Company they must look forward to paying their Shareholders dividends, he was bound to say also that they had looked at the public good, and had spent a large amount of capital entirely with this object in view—the view of improving the supply; and although he was not going to say that it was impossible to improve it further, still he did think they had set the example to all Companies drawing from the Thames, in the great work they had undertaken for the improvement of their supply. Few people in London had an adequate idea of the difficulties of supplying a great district. It was very easy to criticize the defects of any supply in the laboratory, but it was another thing to do so in practice; and no one felt more than he the difficulties the Companies had had to encounter. He trusted that the representatives of the Water Companies present would not be too angry with him if he had from the consumers point of view tried to put a little pressure on them.

Dr. TIDY, in response to calls, sincerely thanked those present for their kind invitation. They had not, he said, been that day fed on water, though he should not have been altogether sorry if they had been, in order that he might see the result of such an experiment when he met some of them in the course of a week's time. He must say for the Chelsea Company (and he heartily joined with Dr. Frankland in this matter) that it had always appeared to him that they had had in view, not simply the question of the rights of their Shareholders, but also a very distinct notion of what might be called parliamentary responsibility. He thought all present would agree in saying that the Chelsea Company, as far as they could see their way, had not merely looked at the rights which an Act of Parliament gave them. On this great subject there would, of course, be a variety of opinions, and the present was not the time for their discussion; but he thought he might venture to say this—that, whatever opinions they held, he was sure the Company tried to do their very best.

The CHAIRMAN thought he might say they had all been admiring the Company's works that morning, and, as Mr. Aird, the Contractor, was present, he asked them to join him in drinking the health of that gentleman.

The toast was drunk, and

Mr. AIRD having expressed his acknowledgments,

Sir W. H. WYATT said they had drunk to the success of the Water Companies of London, and had coupled with that toast the health of the Chairman of one of the Companies; but all of them who had anything to do with those Companies knew that their exertions would be of very little avail unless they were supported by the efforts of the officers devoted to their service. From his own personal experience during the past few months, he could say that the Metropolitan Water Companies were supplied with officers, both as Managers, Secretaries, and Engineers, who really were entitled to the highest possible praise. They performed their duties with a singleness of purpose for which the Water Companies ought to feel extremely grateful, and he believed that every Company had reason to be satisfied with the exertions of its officers. He therefore asked them to drink the health of the Officers of the Water Companies, and he coupled the toast with the name of Mr. Inglis, the Secretary of the New River Company.

The toast was drunk with enthusiasm.

Mr. INGLIS, in returning thanks, said the officers of the Companies represented the hewers of wood and the drawers of water. They drew the water, collected the revenues, examined the accounts, and paid the dividends. It was a very old saying that "a bad workman complains of his tools." There had been times in which the tools of the Water Companies were very poor indeed. They, however—the workmen—did not complain; but happily the tools were now very much improved, and they saw before them that day, and had been inspecting the magnificent materials for conducting the business of water supply which modern science had produced. He assured them they would always do their duty faithfully, and as far as they could effectually.

The CHAIRMAN then referred to the presence of Dr. Farquharson, M.P., and Mr. T. Hawksley, C.E.—gentlemen who were both well known to them. He proposed the health of the visitors, coupling with it the name of Dr. Farquharson.

The toast having been duly honoured,

Dr. FARQUHARSON expressed the satisfaction the visitors had had in going over the Company's works, and observed that they must all feel

grateful to the Companies who at so much cost and credit to themselves brought into the houses of London the supply of water which they so much appreciated.

Mr. HAWKSLEY also responded.

Sir W. H. WYATT, in proposing the next toast, "The health of the scientific gentlemen present," said when they went to Parliament they had to prove an amazing number of things, and their own knowledge went for nothing—they must have the assistance of scientific gentlemen, a number of whom they had succeeded in bringing round them. He coupled with the toast the name of Dr. Pole, who, he said, gave evidence before the Duke of Richmond's celebrated Commission, which did more perhaps for them than any other evidence which had been given.

The toast having been drunk,

Dr. POLE, in acknowledging it, said that he had had a great deal to do with the question of the London Water Supply, and in particular with the Duke of Richmond's Commission, of which he was Secretary, and which he thought established the fact once for all, in a way that could scarcely be disestablished, that London was admirably supplied with water of the Thames, and that the water of the Thames formed the best supply for London. The Companies had endeavoured to do all they could to improve the supply. If they continued in this direction, he thought there would not be much fear of any scheme interfering with them. Such inquiries as they had had, however, rose up periodically to give the Companies, he supposed, a little fillip to keep them up to the mark, and they had always responded to what was required of them. He thought they had nothing to fear so long as they did this.

Mr. G. SMITH, Chairman of the Kent Company, said he had been requested to propose the toast of the day, "The health and prosperity of the Chelsea Company." They were all brethren—were arraigned before one tribunal at the present moment, fighting one common battle, and he hoped they would come out with one success. He was sure they had derived information as well as pleasure from their visit to the Company's works. They might all gather information from one another from these *réunions*, and they might often assist and strengthen each other. They had been very much gratified with what they had seen, and were much indebted to the Chelsea Company for their hospitality.

The toast was drunk with enthusiasm, and three cheers and "one cheer more" were given for the Governor.

Mr. DEEDES expressed the pleasure his Company had had in receiving their visitors on this occasion. They had thought the time was not inopportune for asking them to inspect the Company's works, and see what they had been doing. Whatever the future might be, it would be a matter of sincere pleasure to remember that the Metropolitan Water Companies had for the most part acted in harmony with one another, and whatever might happen he hoped this friendship would not abate. He thanked them on behalf of his colleagues and himself for the manner in which they had drunk the toast, and on his own part for the "one cheer more" which had been bestowed on himself.

Sir W. H. WYATT said there was yet one more toast. The Chelsea Company was admirably served by its officers. Whether they took their excellent friend the Secretary, Mr. Gill, who worked with a zeal which was past commendation, whether they took the heads of the engineering department, Messrs. Simpson and Lea, or whether they took the head of the Solicitor's department, Mr. Few, they were admirably served in every department. Unless seconded by the efforts of those gentlemen, their own work would be of little avail. He asked them to drink the health of the Officers of the Chelsea Company, coupling with it the name of Mr. Gill.

Mr. GILL thanked Sir W. Wyatt for the kind way in which he had proposed the toast, and those present for the way in which they had received it. His friend Mr. Inglis had reminded them that "a bad workman complains of his tools." They had, however, lately had very good tools, supplied through the ingenuity of his friend Mr. Simpson, and they had now no excuse for not performing their work thoroughly well. He believed that their customers were perfectly satisfied, for he received no complaints from them of the quality of the water, and he really did think they had reason to be satisfied. For his own part, he had only to obey the behests of his superiors, and it was very kind of Sir William Wyatt to say that he discharged his duties satisfactorily. He was ably assisted by an excellent staff, who aided him *con amore*, and to them he thought the prosperity of the Company was in a measure due.

The visitors then separated for a few minutes, but shortly afterwards re-assembled and proceeded by boat down the river to Seething Wells, where the filter-beds, pumping machinery, and the works generally were inspected.

The following is a general description of the works of the Company, circulated for the information of the visitors:—The water is now taken from the Thames at about half a mile below Sunbury Lock. It has at first to pass through an iron grating at the intake—guarded by a moveable wooden screen, so arranged as to prevent the accumulation of river *débris* from being drawn through the grating—and then through two fine wire screens into the covered wells, from which the water is pumped into the regulating-tank (a lift of about 19 feet only) by means of two steam-engines each of 40-horse power. From the regulating-tank the water runs into any one of the four subsidence reservoirs. Each of these is capable of holding 35 million gallons, the capacity of the four being 140 millions; or, if necessary, the water can be delivered into the 36-inch main and sent direct from the intake on to the filters at Seething Wells, a distance of 5 miles. From the reservoirs the water flows by gravitation through a 36-inch main to the filter-beds at Seething Wells. The filter-beds are seven in number, and have an area of about 7 acres. Four or five of these filters are usually in work (according to the condition of the water), or sufficient for keeping up the supply to the service reservoirs on Putney Heath. The filters that are not in use are cleaned, and the sand from the surface (usually about 2 inches of it) is removed, washed, dried, and replaced. When this is done, they are in their turn "flooded," and the others drained off and treated in the same manner. The filtering medium consists of coarse ballast, coarse and fine gravel, and a top layer of sand of about 3 feet in thickness, the total depth of materials being 8 feet. From the filter-beds the water runs into the filtered water-tanks, and thence into the engine wells, from which it is pumped up to the service reservoirs on Putney Heath, a distance of over 4 miles, through three mains, two of 30 inches and one of 15 inches diameter. There are six steam pumping-engines of 150-horse power each, working in pairs; four of these (two pairs) are sufficient to raise 10 million gallons per day of 24 hours into the service reservoirs on Putney Heath. Four only of the engines are worked at a time, and two are held in reserve. The service reservoirs on Putney Heath are capable of holding 11 million gallons. They are 180 feet above the level of the engine wells at Kingston. From these reservoirs the water flows by gravitation through four mains—viz., two of 24 inches and two of 12 inches diameter—to Putney, where they pass over the river to Fulham. From Fulham they are branched off at various points into the service-pipes, through which the domestic supply of the whole district is afforded. From the Putney reservoirs the water flows by gravitation into the district to an altitude of about 120 feet above Trinity datum.

THE USE OF "IRON SPONGE" FOR THE PURIFICATION OF GAS.

At the First Annual Meeting of the Central New York Gas Engineers Association, held at Syracuse, N.Y., on Thursday, May 20, a paper, on "Iron Sponge," was read by Mr. C. A. WHITE, of Rochester, N.Y., and we now reproduce it from the "Official Report" in the *American Gaslight Journal* of the 16th ult. It was as follows:—

The use of a new material for the purification of gas, known as "iron sponge," has for some little time been attracting the attention of the profession, and quite a number of companies are using it with marked beneficial results.

Iron sponge is obtained by treating oxide of iron in contact with carbon at a suitable heat, with practically complete isolation from the atmosphere. It retains the general shape of the ore from which it is derived, though expanded in bulk, and showing a marked loss of weight. The sponge consists of the now volatile matter of the raw ore; that is, the portion not capable of volatilization, either by the degree of heat employed, or by contact with carbon. The loss of the volatile matter separating from the ore leaves minute cells throughout its entire mass, rendering it extremely sensitive to chemical action.

Before entering into a consideration of the action of gas upon the sponge, it will be better that I should allude briefly to the manner of preparing the sponge for the boxes, the process being simply to wet the sponge, and turn it over until the mass is perfectly wet through, or rather moistened, so as to adhere slightly when pressed in the hand.

Regarding the chemical action of the gas upon the sponge, not having any apparatus for experiment, I submit the opinions of Mr. Robert Young, Engineer and Superintendent of the Allegheny City Gas Company, who states that the iron contained is partly a hydrated sesquioxide (Fe_2O_3HO); this is placed in the purifying-box, and the sulphuretted hydrogen brought in contact with it. The three atoms of oxygen combine with three atoms of hydrogen, and form water, and three atoms of hydrogen are liberated; and the sulphur combines with the iron and forms sesquisulphide of iron (Fe_2S_3). On exposure to the air the oxygen displaces the sulphur, and the iron re-oxidizes. Thus it continues until we have more sulphur than iron (for it increases in bulk every time it is used, the increase being stored away for future use), and we have reduced the iron and increased the sulphur so much that it will not pay to handle it.

Now for the carbonic acid. The material holds a large amount of water that takes up any ammonia which may pass the scrubber. This will neutralize the carbonic acid and form carbonate of ammonia. If I find, on testing the gas after it leaves the purifying-boxes, any carbonic acid, I let a little more ammonia pass the scrubber, and that neutralizes it; and there is no trouble unless I get more carbonate of ammonia than the water is able to hold, when it would pass off with the gas, though I have never found this to be the case yet.

When we charge a box and expose the material to the air, the rapid oxidation of the iron causes the mass to become very hot, but not red hot, and the carbonate of ammonia and water are evolved, which is readily detected on going into the room; but there are no obnoxious odours, as there are from lime.

Professor George Hay, Analytical Chemist of Pittsburgh, Pa., says that iron sponge has been manufactured for years in England and Scotland for the purpose of filtering water—depriving water contaminated by organic impurities of its sulphur, which remains with the iron as sulphide of iron. Organic phosphorus compounds are also decomposed, phosphorus and sulphur being removed, together with mechanically suspended impurities, leaving the water hardly, if at all, putrescible. Its minute state of division and its porosity increase its affinity for sulphur in any form. In iron sponge purifying material the iron exists as hydrated sesquioxide, in which condition its affinity for sulphur in the form of sulphuretted hydrogen, sulphocyanogen, sulphide of ammonium, or other sulphides, is very strong.

Having thus considered the preparation of the sponge and the action of the gas thereon, let us look upon the working results that have been obtained by its use, under which would naturally arise the questions—Does it fulfil the claim of the manufacturers in an increased purification of gas per bushel? Is there any reduction in pressure? Is there the same amount of obnoxious odours present as in the use of lime? Can we claim a saving not alone in material, but in labour?

It certainly does give an increased purification per bushel, as actually demonstrated by its use at the works of which I was Engineer. It is needless for me to enter into the details of how we came to adopt the iron sponge at our works; suffice it that in December, 1879, we commenced its use. I will here add that I was at the outset somewhat afraid that it would not prove to be what it was represented, as the boxes required to be charged so very often, and the material only purified 1600 cubic feet of gas per bushel. Still I was partly prepared for this, as I had been informed that it required some time to develop its merits.

Mr. Young's statement of the chemical action shows exactly why this is so. The second charge of the boxes—that is, the second time the material was used—showed a purification of 2000 cubic feet per bushel; third time, 2500 do.; fourth time, 3025 do.; fifth time, 4120 do.; sixth time, 5460 do.; and gradually increasing until a maximum of 12,710 cubic feet per bushel has been obtained.

I propose to compare briefly the results of the months of February, March, and April, of the years 1879 and 1880, the former using lime, the latter the iron sponge:—

Feb.,	1879 (lime)	6,250	cubic feet per bushel.
March,	1879 „	7,268	„ „
April,	1879 „	5,900	„ „
	Or an average of . . .	6,472	cubic feet per bushel.

For the same months, using the iron sponge, and that not nearly up to what it should do, has done—

Feb.,	1880 (iron sponge) .	6,200	cubic feet per bushel.
March,	1880, „ . .	9,882	„ „
April,	1880, „ . .	11,300	„ „
	Or an average of . . .	9,127	cubic feet per bushel.

Showing an increase over lime of nearly 41 per cent.

The largest amount purified per bushel up to date has been 12,710 cubic feet.

The number of days the boxes lasted was—

		Feb.	March.	April.
1879.	Lime	4	.. 6	.. 6
1880.	Sponge	7	.. 15	.. 15

Total gas manufactured during three months of 1879 . 12,404,000 cubic feet.
„ „ „ 1880 . 13,431,000 „
Or an increase of 8 per cent. over 1879.

The decrease in pressure, as shown at inlet to centre seal, was 2-10ths of an inch, and this has remained since using the sponge. There is certainly an absence of most of the obnoxious vapours that are present with the use of lime, and the men who do the work state that it does not have the same deleterious effect upon the eyes, and they much prefer its use.

The question of saving is an important one, and must not be overlooked. The cost of lime used at our works during the year amounted to 700 dols. The cost of the iron sponge was 550 dols. The claim is made that it will last for two years. Allow it to last only 18 months, and we have a saving in material alone of 500 dols. There is also a saving in labour. As shown in this report, the average life of a box of lime was 5¼ days during the period of 1879, as against 12½ days during 1880—a gain of 140 per cent., not taking into account the increase of 8 per cent. of manufacture. During 1879 one man was continually employed in preparing the lime, filling boxes, and wheeling away the refuse or spent lime, the wages paid being 2.25 dols. per day, or 67.50 dols. per month. With the iron sponge the labour is reduced to a minimum, and as its preparation does not require any particular skill, ordinary labourers can be employed. Allowing 2 men half a day each in filling and the same in emptying, we have 2 men, 1 day each, or 2 days, at 1.25 dols. = 2.50 dols. When the sponge is taken out of the boxes it is spread upon the floor to a depth of 8 or 10 inches, where it is allowed to remain for two or three days, when the same men will occupy one hour in turning it over—this being repeated two or three times, when the sponge is wetted down and stacked ready for use. All this entailing a cost of, say, 2 men, 4 hours = 8 hours, at 1.25 dols. per day = 96 cents.

The labour account with lime, per box . . . . 13.50 dols.
" " sponge, " . . . . 3.46 "

Of course this refers to where only ordinary labourers, such as we employ in the yard, are used. Where the regular purifying man is retained, the cost will increase.

There is also a saving in the cartage away of spent lime—not only an expense, but a question of room for dumpage. This is entirely done away with, and there are no unsightly and costly monuments to the memory of departed funds laid away in material, labour, &c., in our purifying-houses.

In answer to questions by some of those present, Mr. WHITE added: There has been an increase in bulk from 1000 to 1200 bushels in five months. After taking the sponge from the first box, two men pile it 18 inches thick. It heats up, throws off the ammonia, and it is then spread to 8 inches thick and allowed to cool. Since Dec. 13, 1879, I have had no extra-paid help in the purifying-house. The hands work two hours every other day. I use one layer of lime; but this is not renewed, going back into the box every change. My purification by lime costs 0·91 cent per 1000 feet; and I purify 6500 feet per bushel of lime. I cannot tell what will be the cost per 1000 feet for sponge until we know how long it will last, so that we may know what proportion to charge per month. When I purchased my sponge it cost 55 cents per bushel; but there has been a slight advance since then, due to the rise in the price of iron.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is no very material change to notice in the condition of the coal trade of this district. An extremely depressed tone still prevails all through the market, with most descriptions of round coal offering at very low figures. The demand both for best and common coals is of the most limited description, the home trade requirements being very small, whilst for shipment there is an exceptional scarcity of inquiries, and for sales in bulk prices, as a rule, are so much a matter of arrangement between buyer and seller that it is scarcely possible to quote any fixed rates. The better qualities of round coal, such as good Wigan Arley, can be bought in quantities at the pit mouth at under 7s. per ton, and good qualities of common round coal are offered at from 4s. 6d. to 4s. 9d. per ton.

In the gas coal trade there is little or no alteration to report. The general weakness of the market has its natural effect upon sellers of this class of fuel, and the gas coal contracts are still being tendered for at very low figures and for long forward deliveries, good ordinary screened Lancashire gas coal being offered freely at 5s. 9d. to 6s. per ton at the pit. Cannel, although not so much affected as the ordinary gas coals, also exhibits a tendency towards weakness.

For engine fuel there is a moderate inquiry so far as slack is concerned, and although supplies are still quite sufficient to meet the requirements of consumers, sellers as a rule hold firmly for late rates. Burgy, however, only meets with a very dull sale. The average prices at the pit mouth are about 3s. 9d. to 4s. 3d. per ton for burgy, 3s. to 3s. 6d. for ordinary slack, and 3s. 6d. to 4s. per ton for some of the better qualities.

Short time prevails generally throughout Lancashire, colliery proprietors not caring to increase their stocks, which, in many cases, are already very heavy, and, as a consequence, a large proportion of the pits are not working more than half time.

There has only been a very limited amount of business doing in the iron trade of this district during the past week, and prices have been, if anything, a shade weaker. Lancashire makers still quote 47s. 6d. per ton, less 2½, as their nominal price for foundry and forge iron delivered into the Manchester district; but where sales are made they are taking less. Finished iron is offered at very low figures for immediate specifications, and Lancashire bars delivered into the Manchester district can be bought as low as £5 17s. 6d. per ton.

The output of pig iron is being gradually reduced, owing to the depressed state of trade; one large firm having blown out three furnaces out of eight which were recently in blast, and many of the finished iron works are now running short time.

THE SOUTH STAFFORDSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The past week has witnessed a somewhat improved state of things in the iron and coal trades of this district. Not only have the orders which have come to hand been more numerous, but the local markets have shown a much firmer tone than has been witnessed of late. The greatly decreasing number of furnaces in blast throughout the whole of the South Staffordshire district has so far arrested the superabundant output that existed at the commencement of the quarter, and makers are now inclined to withhold stock in bulk until the turn of quarter-day. These facts, combined with the relaxation of energy on the part of agents of foreign brands, appear to have considerably diminished the keen competition which was observable in the markets, and the disposition evinced by buyers to make purchases for immediate delivery has brought about a more healthy state of business. Though the coal trade is scarcely more active than it was a week or two back, yet the prospects are more favourable, as, independently of the iron trade, the autumn contracts are now in view.

Both the iron and the coal masters are eagerly looking forward to the quarterly meetings which will be held at Wolverhampton on the 7th, and at Birmingham on the 8th inst. Though it is considered doubtful as to whether any alteration at all in prices will be made to rule for the ensuing quarter, it is confidently expected that an increased business will be done; although, on reviewing the operations of the past three months, things have not been so decidedly dull as they have been considered, and notwithstanding the large number of blast furnaces that have been blown out, the quantity of pig iron that has been made during the quarter must have been very great. Since the commencement of April the number of furnaces must have been reduced by at least a score, but in the majority of cases those blown out were of the old-fashioned type, and, therefore, the least productive, whilst those in full working order at the present time are of the most recent construction, and average a large output. In all probability from 8000 to 9000 tons is still about the weekly average. Withal stocks in the hands of makers are not large, and, if the commonest makes are excepted, sellers are firm at the quoted prices. Coal, the inferior qualities of which must be regulated in value to a great extent by the state of the iron trade, stands in a like ratio, and with the exception of a few of the local shallow pits, which are only producing about half the quantity of which they are capable, little cause for complaint exists. The foreign markets are still producing a good demand, and the home trade is fairly brisk. During the week prices were firm for marked bars at £8, also for unmarked bars at £6 15s. All-mine hot-air pigs were £3 15s. to £4, and part-mine £3 to £3 7s. 6d. Cinder pigs realized £2 to £2 5s. Minerals of all kinds were in fair demand, but more in particular may be stated ironstone and domestic coal.

THE YORKSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The business done in the leading branches of the iron trade is not over good, the foundries in most parts of the county having very few orders on hand of any note. There is not so much activity to note in connection with the demand for pig iron, and although most of the furnaces are kept in blast, the make is not pushed forward as was the case in the early part of the year. Some of the larger firms are doing a good trade, which finds their men full employment.

The coal trade throughout the whole county is seriously depressed, prices not only being low, but short time being the prevailing custom at almost all the collieries. The demand for house coal was never more fettered, and although many firms are supplying both Silkstones and Barnsley thick-seam coal at low rates, the output, even with the limited working of the pits, exceeds the demand. The collieries in some parts of West Yorkshire are not making more than three days per week on the average. The London trade is now very much crippled by the high tonnage rates, and as the Great Northern Railway Company could not lower their rates without having the sanction of the other Companies, the South Yorkshire owners are unable to send more than a limited tonnage to the Metropolis.

The demand for steam coal is good, but at some of the pits more could be sold if it could be raised. The difficulty the coalowners have to contend with is the raising of the hard and soft coal together; and as the latter is very tender, it deteriorates much with stacking. There is a large tonnage sent to both Hull and Grimsby for shipment to the Baltic and other ports. Prices are, however, very depressed, some of the more recent contracts being entered into at very low rates.

There is a fair tonnage of gas coal raised and forwarded to Derby, Nottingham, and other places with which some of the leading collieries have been fortunate enough to secure contracts.

The coke trade is scarcely so good as it was, but the make is still large, and a good deal is sent away to Frodingham and other places. Smuth and slack are better to get rid of in South Yorkshire, owing to the large consumption for coke-making purposes.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

Steam tonnage was scarce in the Tyne last week, and this circumstance checked the shipments of gas coals. Some of the best Durham collieries were slack of work. The bulk of the shipments were to meet contracts which run over the whole of the year. Business at the second-class pits was quiet. The demand for steam coals has been moderate. Household coals continue to be a drug in the market. There has been an improved inquiry for coke, and an increased business has been done in manufacturing coals.

Steam tonnage has been scarce, and it continues so; but this circumstance does not affect the coasting business, which is excessively dull. There is a great deal more sailing tonnage of from ten keels and upwards than there are orders. Some small vessels have been lying in the Tyne unchartered for eight or ten days; and the business doing to London, the east coast, and the English Channel is of a very negative sort. Rates were, if anything, lower last week. The entire home coal trade is being revolutionized by the railways, which are maintaining a keen and successful competition with seaborne coals in many districts, especially in the supply of coals to the bye-ports in the South of England. The career of small coasting vessels is apparently rapidly drawing to a close.

The demand for water and gas pipes has improved in the Cleveland districts. Small parcels of pipes have been shipped from the Tyne. Spanish lead was about 7s. 6d. per ton lower last week on the Tyne than the week before. The deliveries of lead in bars from Spain have been very considerable. Some parcels of German lead have also been brought into the market. The chemical trade has been very little changed over a week. There has been a slight improvement in the value of some articles. The high-class fire-brick and fire-clay goods factories on the Tyne continue to transact a fairly good business. The second-class makers are adding to their stocks. Prices also are somewhat lower. There is a pretty good sale of cement; but there is no change in prices. There are improved deliveries of Baltic and American timber. Prices are unchanged.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

At a meeting of the Directors of the Bothwell and Uddingston Gas Company, Limited, which was held on the 30th ult., the statement of the affairs of the Company for the year ending April 30, 1880, was read and approved, and ordered to be printed and circulated amongst the Shareholders, in view of the annual meeting of the Company. The Directors have recommended that a dividend of 7½ per cent. be paid this year on the paid-up capital of the Company (£9000), and it is proposed to continue the price of gas at 4s. 7d. per 1000 cubic feet, as during the past year.

On Monday, the 28th ult., the Shareholders of the Forres Gaslight Company held their annual general meeting—Bailie Burnet in the chair. A dividend of 10s. 6d. per share on the original stock, and 5s. 3d. per share on the new stock of the Company, was agreed to, being about 7 per cent. It was resolved to recommend the Directors to reduce the price of gas further, from 8s. 4d. to 7s. per 1000 feet, and to continue the usual rate of discount for prompt payment.

A meeting of the Committee of Management of the Arbroath Gas Corporation was held last Wednesday, when the accounts for the year ending the 31st of May were produced and read. They showed that the revenue was £8972 8s. 7d., and after meeting the expenditure there was a balance of £761 8s. 8d., one-half of which, under the provisions of the Local Gas Act, falls to be paid to the Town Council for public purposes, the other to be given as a rebate to the consumers on their accounts.

After some discussion, it was resolved to recommend to the Gas Corporation that the price of gas remain the same as last year—namely, 5s. per 1000 feet.

The annual general meeting of the Auchterarder Gaslight Company was held on Monday, the 28th ult., when it was resolved to declare a dividend of 8 per cent. on the past year's transactions.

The Kennoway Gaslight Company have reduced the price of their gas 10d. per 1000 cubic feet—from 10s. to 9s. 2d.

The annual meeting of the Kelso Gas Company was held on the 30th ult.—Mr. J. F. S. Darling, the Chairman, presiding. After the statement of accounts for the past year had been submitted and considered, it was resolved to declare the usual dividend of 10 per cent.

A dividend of 7½ per cent. was agreed to at the annual meeting of the Jedburgh Gas Company, which was held last Wednesday, and a sum of £100 was voted to the reserve-fund.

As I anticipated, the question of "The Cheapest Gas in Scotland" is bound to be one of some interest for a time. Already the Directors of the Galashiels Gas Company have followed with the announcement of a reduction in price from 3s. 6d. to 3s. 4d. per 1000 feet, which is certainly the lowest price for gas yet announced in any town in Scotland, whether within or far removed from the coal-fields whence rich cannel coal is obtained.

At the annual meeting of the Hawick Gas Company, held last Friday, the report of the Directors was adopted. Its chief feature of interest was the reduction in the price of gas from 3s. 9d. to 3s. 6½d. per 1000 cubic feet, as indicated in last week's "Notes." A motion to amend an agreement of the Company as to the qualification of Directors, and the percentage to be deducted for depreciation of property, was, after some discussion as to its coming before the meeting in proper legal form, withdrawn. Several interesting speeches were made in connection with the affairs of the Company, more especially by large consumers.

In connection with the magnificent vessel which is being built by Messrs. Elder and Co. for the Emperor of Russia, as a pleasure yacht—a floating palace—the electric light is being used on an extensive scale, so that she may be ready for launching in time. No fewer than six lamps are in use on the vessel itself, and fully that number are giving forth their brilliant light in the works where the immense engines for the yacht are being erected. Even after the launching of the vessel the electric light is to be employed for the benefit of the night shift; and, eventually, the floating palace is to be fitted up with about 60 electric lamps, supplied with the necessary currents from a Siemens magneto-electric machine of great power.

The Glasgow pig iron warrant market has been very firm during the past week. There was only a limited amount of business done, but a hardening tendency has been displayed. As high as 48s. 9d. cash was paid on Thursday, and on Friday afternoon up to 49s. 4½d. cash was paid, although the price was somewhat lower at the close of the market.

From all the mining districts there are reports of a marked degree of dulness in the coal trade.

A new list of Members of the Institution of Civil Engineers has just been issued, from which it appears that there are now on the books 1217 Members, 1299 Associate Members, 579 Associates, 18 Honorary Members, and 657 Students—together 3770 of all classes. At the same period last year the numbers of the several classes were 1148, 1200, 622, 17, and 591, making a total of 3578; showing an increase at the rate of nearly 5½ per cent. During the past session, the elections have comprised 2 Honorary Members, 43 Members, 129 Associate Members, and 15 Associates; and 160 Students have been admitted. The Council have just published their list of awards "for some of the original communications presented during the past session, on account of the science, talent, or industry shown in the consideration of the several subjects dealt with." Among others we notice that a Telford medal, and a Telford premium, have been awarded to Mr. H. E. Jones, for his paper on "The Purification of Gas;" a Telford premium to Mr. C. J. Wood, for his paper on "Tunnel Outlets from Storeage Reservoirs;" and a Manby premium to Mr. G. Chatterton, M.A., for his paper on "The Main Drainage of Torquay."

Pittenweem Gas Company.—The annual general meeting of this Company was held on Friday, the 25th ult., when an abstract of the accounts for the year ending May 31 last was presented. It showed a balance of profit on the working of about £390, and out of this amount it was decided to declare a dividend of 8 per cent., and carry the balance to the works account and to the reduction of cost of extensions made during the past year. The price charged for gas supplied by the Company is 5s. 10d. per 1000 feet—the lowest it has ever reached; and although it was pointed out at the meeting that a reduction of 10d. per 1000 feet could be made, without fear of a diminution of dividend for the current year, and still leave a balance of £130 to be carried to the works account, it was determined to keep the price as at present. During the past year the Company sent into the two districts supplied by them—Pittenweem and St. Monance—2,730,710 cubic feet of gas, the coal for the production of which had cost at the rate of 1s. 10·19d. per 1000 feet. The past year's working was regarded as the most successful the Company have ever had, and in recognition of the efforts of the *employés* to bring about such a result, it was unanimously agreed to give them various small sums of money according to their position in the works. The capital of the Company is only £2000.

Gas Companies and their Residuals.—The *Chemical News* of Friday, the 25th ult., contained an article, by a Fellow of the Chemical Society and of the Institute of Chemistry, headed "Distillation of Gas Tar: Tar Distillers *v.* Gas Companies," which, after pointing out the vast strides made during recent years in the treatment of residuals, refers specially to the fact of chemical works having been lately started by the Chartered Gas Company at Beckton. The writer holds that the movement now taking place, and influencing gas manufacture, is a step in the right direction, and is one which is calculated to introduce progress and reform in a process hitherto admittedly crude. He considers that the distillation of tar, and its conversion into such products as ammonia, benzol, naphthas, carbolic acid, creosote, and anthracene up to pitch, are strictly within a gas manager's province, and in absorbing the larger share of the industry, which he believes ultimately will be done, it is lifted from an antiquated and empirical position, and placed on a footing where it will receive the many advantages derivable from the infusion of new blood, and the supervision and direction springing from the more advanced knowledge and requirements of the present times. The article concludes in these words: "We think it is not too much to hazard this assertion, inasmuch as already do we see fruit of a venture that at the period of its contemplation was met with considerable rebuff and evil prognostication. It was urged, on the one hand, that 'no gas company would either distil or succeed in distilling tar.' It was said, on the other, that they lacked experience, and knowledge was impossible to obtain. More, that even if actually 'launched and in operation they would fail in showing financial success.' Yet, in direct opposition to these statements, what do we really see? Within the brief space of a few short months has sprung up in our midst one of the finest and most perfect plants for tar distilling in the kingdom, and on the grounds and within the walls of an English Gas Company, second to none in dimension, efficiency, utility, and advantages derivable from the adoption of modern improvement, which, by-the-by, as regards some of them (curiously enough) are only now finding their way into other establishments whose origin have not been altogether of yesterday's date. Here we have the nucleus of a concern that may, as time progresses, possibly rival that of our continental neighbours, the French, although whether we shall at any time award a like amount of scientific interest and inquiry to the pursuit of a commercial object is altogether another matter. Whether we shall ever conduct in our technical laboratories a class of work such as is carried out in those of the Paris Gas Company under the able directorship of its accomplished chemist and professor, M. Audouin, or appoint at their head men of similar talent and capacity, is also a matter of considerable surmise."

Register of Patents.

APPLICATIONS FOR LETTERS PATENT.

2161.—Wordsworth, C. T., Leeds, Yorks, "Improvements in gas motor engines." May 28, 1880.

2227.—Spence, P., Manchester, "An improved method of purifying sewage." June 1, 1880.

2229.—Clarke, C. L., and Leigh, J., Manchester, "Improvements in the construction of apparatus for lighting gas, part of which apparatus is also applicable to other electrical appliances." June 1, 1880.

2255.—Sugg, W. T., Westminster, "Improved apparatus for manufacturing illuminating gas." June 2, 1880.

2260.—Monk, W. W., Bournemouth, Hampshire, "Improvements in apparatus used in the manufacture of gas." June 3, 1880.

2265.—Williams, M., Wigan, Lancashire, "Improvements in methods of and apparatus for increasing the illuminating power of gas-flames." June 3, 1880.

2271.—Watson, J. J.W., St. Marychurch, South Devon, "Improvements in or relating to artificial illumination, and in apparatus connected therewith." June 3, 1880.

2288.—Robbins, J., Uxbridge Road, London, "An improved joint for water and other pipes." June 5, 1880.

2299.—Livesey, J., Westminster, "Improvements in gas-motor engines." A communication. June 7, 1880.

2337.—Phelps, R., Birmingham, "Certain improvements in gasaliers and parts ordinarily used in connection therewith." June 9, 1880.

2338.—Wilson, J. G., Manchester, "An improved construction of condensing steam-engine and boiler with automatic air or gas and water supply, also applicable to other steam generators or boilers." A communication. June 9, 1880.

2344.—Robinson, H., Manchester, "Improvements in gas motor engines." June 10, 1880.

2380.—Hildebrandt, J. A. R., Manchester, "Improvements in exhausters for gases or liquids." A communication. June 12, 1880.

2422.—Foulis, W., Glasgow, "Improvements in gas-engines." June 15, 1880.

2467.—Kesseler, C., Berlin, "Improvements in apparatus for the production of lighting gas from gasoline and other light hydrocarbon liquids, also applicable for enriching other such lighting gas." A communication. June 18, 1880.

2577.—Johnson, J. H., Lincoln's Inn Fields, London, "Improvements in joints or couplings for pipes or tubes." A communication. June 24, 1880.

2583.—Midgley, J. W., Keighley, Yorks, "Improvements in apparatus for raising and forcing liquids, also applicable for regulating the pressure of liquids, gas, and steam." June 24, 1880.

2593.—Phelps, R., Birmingham, "Certain improvements in gasaliers and other like fittings known as 'slides or pendants.'" June 25, 1880.

2604.—Thomas, J. T. C., Minories, London, "Improvements in lighting and heating apparatus." June 26, 1880.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

5102.—Snelgrove, H. R., Strand, London, "Improvements in the manufacture of gas and in apparatus therefor, and for carburetting and purifying the same." Dec. 12, 1879.

5177.—Mackenzie, J., Regent's Park, London, "Improvements in apparatus for lighting gas by electricity." Dec. 17, 1879.

5267.—Sugg, W. T., Westminster, "Improvements in the construction of gas lamps or lanterns." Dec. 24, 1879.

5275.—Wild, J., Huddersfield, Yorks, "Improvements in the method of and apparatus for regulating or controlling the pressure of gas, being also applicable for regulating or checking the pressure of steam, water, or other fluids." Dec. 24, 1879.

5310.—Bonneville, H. A., Paris, "Improvements in the manufacture of gas, and in the apparatus used therefor." A communication. Dec. 29, 1879.

5323.—Bull, H. C., New York, U.S.A., "Improvements in the manufacture of gas and in apparatus therefor, and for other purposes." Dec. 31, 1879.

17.—Jensen, P., Chancery Lane, London, "Improvements in and connected with steam and water jet motors, partly applicable to fluid-meters." A communication. Jan. 2, 1880.

62.—Silber, A. M., Whitecross Street, London, "Improvements in lamp or gas-stoves." Jan. 7, 1880.

282.—Sugg, W. T., Westminster, "Improvements in the construction of gas-burners." Jan. 22, 1880.

591.—Pocock, A. W., Wandsworth, London, "Improvements in meters for measuring liquids." Feb. 10, 1880.

1055.—M'Lennan, J., Finsbury Park Road, and Owen, R., Haverstock Hill, London, "Improvements in apparatus for regulating the supply of gas." March 11, 1880.

1456.—Lowe, C., and Gill, J., Manchester, "Improvements in the manufacture of certain coal tar and residual products." April 9, 1880.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

2033.—Lake, W. R., "Improvements in gas-meters." May 24, 1877.

2069.—Brett, R. W., "Improvements in lanterns for public or private lighting, and in the mode of supporting the same." May 28, 1877.

2238.—Newman, J., "Improvements in apparatus for transmitting gas from the retorts to the hydraulic main." June 8, 1877.

2417.—Paul, E., "Improvements in and connected with pumps." June 22, 1877.

2420.—Colson, A., "Improvements in apparatus used in the manufacture of gas." June 22, 1877.

2447.—Puckett, W., "Improvements in gas apparatus for heating water or other liquids." June 23, 1877.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

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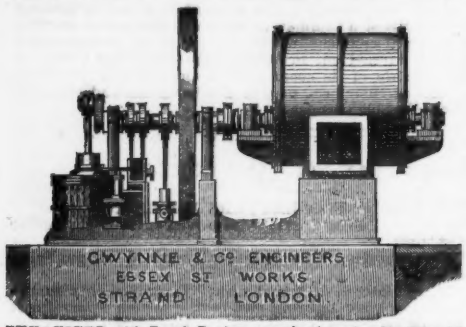

EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

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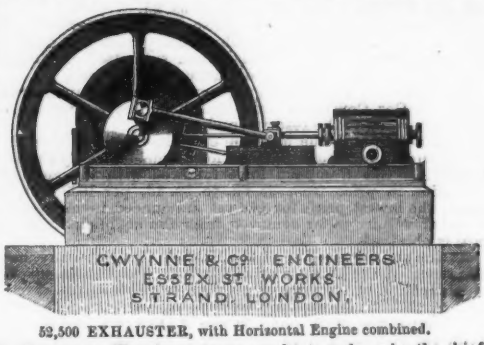

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Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

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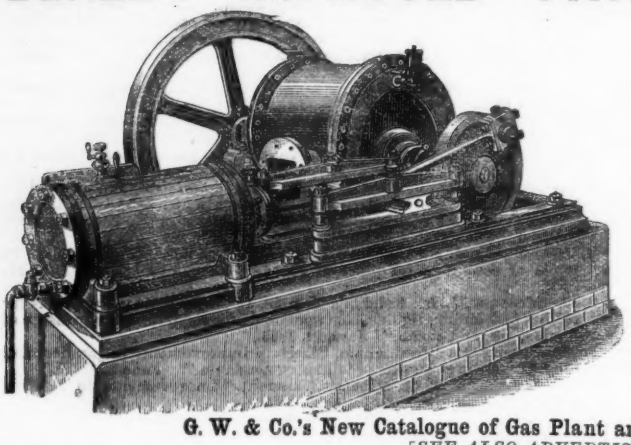

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MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

[*SEE ALSO ADVERTISEMENT, PAGE* 38.]

Phœnix Engineering Works: HOLLAND STREET, SOUTHWARK, S.E.

WANTED, Readers of the NEW Edition, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, by a Young Man (married), a Situation in a Gas-Works. Is the son of a Manager, and is a good Main and Service Layer. Can do any Fittings in the Retort-House; also can Fix and Read Indexes of Meters, and has had experience both at Lathe and Vice. Very steady.
Apply to the MANAGER, Gas-Works, Crayford, KENT.

WANTED, by the Advertiser, a Young Man aged 25, and Married, a Situation as MANAGER of a small Gas-Works. Applicant has a thorough knowledge of the Manufacture and Distribution of Gas in all its branches. Has had several years experience as Manager of a Works (make 15 millions). Has no objection to go Abroad. Satisfactory reasons for change.
Address No. 663, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE West Bromwich Improvement Commissioners require an ACCOUNTANT CLERK at their new Gas-Works, Albion, West Bromwich, to enter on his duties at once. Applicants must thoroughly understand Book-keeping, double and single entry, and must have had experience in the Keeping of Gas-Works Accounts.
He will be required to devote the whole of his time to the discharge of such duties. Salary £140 per annum. Applications must be in candidates own handwriting, stating age and qualifications, and must be sent with three original testimonials, addressed to me at the Town Hall, West Bromwich, on or before the 13th of July inst. Approved security in the sum of £500 will be required.
CHAS. H. BAYLEY,
Clerk to the Commissioners.
Town Hall, West Bromwich, July 3, 1880.

STATION-METER (Second-hand) Wanted, to pass 3000 feet of gas per hour.
Address SECRETARY, Gas Company, ALYTH, N.B.

WANTED, two active and experienced men as WATER-WORKS FITTERS to the Luton Water Company. They must be able to Lay Mains, Attach Lead and Iron Services, do Plumbing, and be well up in Water-Works matters generally. They must be steady, industrious men, and well recommended.
Apply, stating age, wages required, with other particulars, to Mr. T. F. MIDDLEMISS, Engineer and Manager, Water Company's Offices, Luton, BEDS.

PORTSEA ISLAND GAS COMPANY.

THE Company require the services of a competent person to act as FOREMAN. He must be skilled in the Manufacture of Gas, Purification, Mechanical Work, and the general routine of a Gas-Works. Wages to commence at £3 per week.
Applications, stating age, qualifications, accompanied by testimonials, to be sent to me on or before the 8th of July.
S. B. DARWIN.

WANTED, a Second-hand Gas Tank and Holder, 40 ft. diameter, 14 to 16 ft. deep; in perfect order, complete ready for erection.
Price to include delivery alongside ship, Liverpool or London.
Tenders to be addressed No. 670, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR IMMEDIATE SALE—Two Purifiers, each 7 ft. 3 in. by 5 ft. 6 in. and 3 ft. 6 in. deep, with wooden Sieves, Valve and other Connections, very suitable for a small Gas-Works, where the make is from 3 to 4 million cubic feet per annum.
Further information can be received on application to the MANAGER, Gas-Works, Kirriemuir, FORFARSHIRE.

FOR SALE—Single Gasholder, 158 ft. by 30½ ft. in good condition, to be taken out early next year, and replaced by S. C. & Sons with a Treble Lift. Excellent Guide Framing, consisting of 20 handsome Columns and wrought-iron Girders. May be seen at work at the Gas-Works, Portsea.
Particulars on application to S. CUTLER AND SONS, Millwall, LONDON, E.

ON SALE—The Cast-Iron Fire Doors, Mouthpieces, Ascension, H, and Dip Pipes, Hydraulic Mains, &c., belonging to six settings of six retorts; also One Station Meter to pass 8000 feet per hour (makers West and Gregson).
The above are in capital condition, and can be seen at the Gas-Works, Guildford. No reasonable offer refused.
Further particulars on application to Mr. LONGWORTH, Gas Offices, GUILDFORD.

THE Sheffield United Gaslight Company OFFER for SALE the following lots of Retort-House FITTINGS, which they are now taking down at two of their Stations:—

54 Pieces Cast-Iron Hydraulic Main, U-shaped, 9 ft. 6 in. by 18 in. by 18 in.
16 Pieces Cast-Iron Hydraulic Main, U-shaped, 9 ft. 6 in. by 18 in. by 15 in.
4 Pieces Cast-Iron Hydraulic Main, U-shaped, 9 ft. 6 in. by 16 in. by 15 in.
320 Cast-Iron Mouthpieces, D-shaped, 21 in. by 15 in.
160 Lengths 4-in. Cast-Iron Ascension-Pipes, straight, 7 ft. 6 in. long.
215 Lengths 4-in. Cast-Iron Ascension-Pipes, straight, 5 ft. 6 in. long.
50 Lengths 4-in. Cast-Iron Ascension-Pipes, curved, 5 ft. 6 in. long.
60 Lengths 4-in. Cast-Iron Ascension-Pipes, curved, 2 ft. 8 in.
37 Lengths 4-in. Cast-Iron Ascension-Pipes, curved, 10 ft. 2 in.
40 Lengths 4-in. Cast-Iron Ascension-Pipes, straight, 5 ft. 10 in.
17 Lengths 4-in. Cast-Iron Ascension-Pipes, straight, 5 ft. 5 in.
481 Lengths 4-in. Cast-Iron H-Pipes.
506 Lengths 4-in. Cast-Iron Dip-Pipes.

The above apparatus has been in use up to a recent date, and is adapted for re-erection.
The Company will be prepared to receive an offer for the whole or any portion of the above. Price £4 per ton, loaded into trucks at Sheffield.
Applications to be addressed to the undersigned.
THOS. ROBERTS, Manager.
Gas Office, Sheffield, March 25, 1880.

GAS PLANT FOR SALE.

THE Coventry Gas Company have for SALE—

SCRUBBERS.—One 5 ft. 6 in. diameter, 15 ft. high. One ft. diameter, 20 ft. high; with or without 8-in. Connections and Valves.

STEAM-JET VENTILATOR.—One No. 2 Körting's Patent Jet Ventilator, with Chest. One No. 3¼ Körting's Patent Jet Blower.

VALVES.—Two Cockey's Dry Central Valves for four Purifiers. One 12-in. Cathels's Four-way Valve.

The above are being replaced by larger apparatus, and can be removed at once. Also a 100-light Gas Apparatus (Porter's make); this includes a Gasholder, 14 ft. diameter and 10 ft. high, which could be sold separately.

For particulars and prices apply to

W. L. ROBINSON, Manager.

Gas-Works, Coventry, April 17, 1880.

GAS PLANT FOR SALE.

THE Maidstone Gas Company having enlarged their Works, offer the following Apparatus for Sale in good condition:—

SCRUBBERS.—One Tower Scrubber 30 ft. high by 10 ft. diameter, with Distributor, and partly fitted with Livesey's boards.

CONDENSERS.—One Set of Annular Condensers, consisting of 9 Pipes 17 ft. high, outer diameter 2 ft. 6 in., fitted with 12-in. Valves complete.

ENGINES.—Two 12-Horse Power Horizontal Engines in very good condition.

STATION-METER.—By Milne and Son, in first-class condition, ornamental case, with Valves and Bye-pass complete; to pass 30,000 cubic feet per hour.

HYDRAULIC MAIN.—Six 8 ft. by 18 in. Hydraulic Main D wrought iron; 24 8 ft. 9 in. by 18 in. Hydraulic Main D wrought iron. Nearly new.

BRIDGE AND ASCENSION PIPES.—90 6 in. by 4 in. Bridge-Pipes, and a quantity of 6-in. Ascension-Pipes and Bends.

RETORTS.—31 Rounds, 15 in. diameter and 9½ ft. long, in two pieces. 2 Ovals, 21 in. by 15 in. and 9 ft. long, in one piece. All of Stourbridge Fire-Clay, and in good condition.

For further particulars and price apply to

JOHN WEST, Engineer and Manager.

Gas Works, Maidstone, April 21, 1880.

PARISHES and DISTRICTS adopting THE AVERAGE METER SYSTEM.

Notice is hereby given that owing to a reduction having been determined upon with the concurrence of the Gas Referees in the number of meters per lamp, the Lighting Committee of the Vestry of St. Pancras have for DISPOSAL at £2 2s. per meter and box, 50 Cast-Iron METER BOXES, 50 Cast-Iron cased Compensating Meters of the most improved construction, with a capacity of 12 cubic feet of gas per hour, with a drum equal in diameter to that of an ordinary 5-light meter, and also 50 complete sets of connections.

The whole of the above articles are in a serviceable condition, and were manufactured by Messrs. Parkinson and Co., of City Road, London. This offers a favourable opportunity to any parish or district about to adopt the advantages of the meter system to the lighting of the public lamps.

By order,

THOMAS ECCLESTON GIBB, Vestry Clerk.

CAMBRIDGE UNIVERSITY AND TOWN GASLIGHT COMPANY.

TO TAR DISTILLERS AND OTHERS.

THE Directors of this Company will at their meeting on the 29th inst. be prepared to receive TENDERS for the Surplus TAR produced at these Works for a period of One or Two years from November next. Probable make about 140,000 gallons per year.

Sealed tenders, addressed to the Chairman, to be delivered not later than the 27th inst.

Further particulars may be had from

JAMES WEEKS, Manager.

Gas Office, Cambridge, July 1, 1880.

RAMSGATE IMPROVEMENT COMMISSIONERS, GAS AND WATER DEPARTMENT.

GAS-WORKS.

THE Gas and Water Committee invite TENDERS for Cast-Iron PIPES and Special Castings, together with about 20 tons of Wrought-Iron Girders and 55 tons of 1-in. Cast-Iron Floor Plates, particulars of which may be had and drawings seen on application.

WATER-WORKS.

Tenders are also invited for about 7200 ft. of 16 in. Iron Pipe; 7000 ft. of 9-in. Iron Pipe; and 510 ft. of 12-in. Iron Pipe, together with from 30 to 40 tons of Special Castings, particulars of which can be obtained on application.

Tenders, which must be sent in not later than 10 a.m. on Thursday, July 15, addressed to the Chairman of the Gas and Water Committee, Gas-Works, Ramsgate, to state price per ton for Special Castings, and per foot run for Pipes.

The Committee do not bind themselves to accept the lowest or any tender.

WILLIAM A. VALON, Engineer.

July 1, 1880.]

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—

About 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12-in. Slide-Valves and 12-in. Connections.

Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12-in. Connections.

Exhauster (Jones) to pass about 15,000 feet per hour.

Exhauster (Beales) to pass about 25,000 feet per hour.

Two Vertical Steam-Engines, each about 6-horse powe with Pulleys, and Shafting used for driving the above.

Boiler 14 ft. 6 in. by 8 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.

4-horse power Horizontal Steam-Engine.

Three 4-in. Pumps, with cranked Shafting and a pair o Mitre Wheels.

Two Purifiers, 16 ft. by 8 ft., with six 12-in. Slide-Valves and 12-in. Connections.

Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.

Gasholder, Double Lift, capacity 100,000 feet.

Gasholder, Double Lift, capacity 240,000 feet.

One 12-in. Governor, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.

Two 12-in. four-way faced Valves, by Cockey.

For further information, &c., apply to the undersigned.

R. MORLAND, Engineer.

ISLE OF THANET GAS COMPANY.

Sale by tender of 200 New Shares of £25 each; being the first portion of Additional Capital authorized to be raised by Resolutions passed at a General Meeting of Proprietors held on March 27, 1880, in pursuance of the Powers of the Thanet Gas Act, 1877.

THE Directors of the Isle of Thanet Gas Company give notice that they will be prepared to receive not later than 10 o'clock a.m., on Friday, July 16, 1880, sealed tenders for 200 Shares of £25 each.

The capital now offered is required for the Extension of the Company's Works, and Erection of a New Gasholder to enable them to meet the increased demand for gas.

The existing paid-up capital of the Company is as follows:—

£28,000 Margate Consolidated Stock.

£7000 Loan Capital at 4½ per cent. per annum.

The Consolidated Stock and the New Shares to be issued are entitled to a Dividend of 7 per cent., to be increased or diminished 5s. per cent. for every penny charged in diminution or excess of the standard price of gas—viz., 4s. 2d. per 1000 feet.

The Dividend on the Consolidated Stock for the last 12 months was at the rate of 8 per cent. per annum, and the price of gas 3s. 6d. per 1000 feet. £645 Stock was sold by auction during the past year, and produced £1123 17s. 6d., being at a rate of premium of over 74 per cent.

Forms of tenders can be had at the Gas-Works, Margate, Messrs. Fuller, Marine Library, Ramsgate, and the hotels, and will be sent by post on application.

By order,

THOS. C. FULLER, Secretary.

CONTRACT FOR GASHOLDER, &c.

THE Mayor, Aldermen, and Burgesses of the Borough of Aberavon invite TENDERS for the Construction of a GASHOLDER, 50 ft. in diameter and 16 ft. deep, and also for the construction of Two PURIFIERS, 8 ft. by 8 ft. by 4 ft., with Lifting Apparatus and Centre-Valve and Connections; according to plans and specifications, copies of which can be had on application to Mr. John Henderson, Manager of Gas-Works, Aberavon, South Wales, on payment of half a guinea.

Sealed tenders to be lodged with MARMADUKE TENNANT, Esq., Town Clerk, Aberavon, SOUTH WALES, on or before the 26th of July inst.

WANTAGE GAS-WORKS.

TO COAL MERCHANTS.

THE Commissioners for the Town of Wantage are prepared to receive TENDERS from persons willing to supply 700 Tons and upwards of GAS COAL of the following kinds—namely, Newton Chambers, Healey Thin Seam, Wall and Bench, or Vauxhall Colliery. To be delivered at the Gas-Works, Wantage, in such quantities and at such times as may be required during the year ending June 1, 1881. The pit invoice must be delivered with each truck.

Tenders to be delivered to me, the undersigned, not later than July 10, 1880.

The Commissioners will not pledge themselves to accept the lowest or any tender.

JAMES DORMER, Surveyor, &c.

NEW VOLUME OF WEALE'S RUDIMENTARY SERIES.

Just Published, 12mo, limp cloth, 4s. 6d., in cloth boards 5s. (postage 4d.),

THE Construction of Gas-Works and the Manufacture and Distribution of Coal Gas. Originally written by Samuel Hughes, C.E. Sixth Edition. Re-written and much Enlarged by WILLIAM RICHARDS, C.E. With numerous Illustrations.

CROSBY LOCKWOOD AND CO., 7, STATIONERS HALL COURT, LONDON, E.C.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the Leigh Local Board are prepared to receive TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR, combined, produced at their Works during Two years, commencing on Aug. 1, 1880, and ending on July 31, 1882.

The estimated annual production is 454 Tons, but the same cannot be guaranteed, and may be more or less.

Tenders, stating price per ton of 20 cwt. at the Works, to be sent to me on or before the 19th of July next, endorsed "Tenders for Tar."

The highest tender not necessarily accepted.

JOSEPH TIMMINS, Engineer, &c.

Leigh, Lancs.

TENDERS FOR CANNEL AND COAL.

THE Gas Committee of the Leigh Local Board invite TENDERS for the Supply of 3500 Tons of Best Screened GAS COAL, and 350 Tons of CANNEL, to be delivered at the Leigh and Bedford Goods Depôt (L. & N. W. R. Co.) or laid down in the Works, for Twelve months from the 1st of September next in such quantities and at such periods as the Manager of the Gas-Works may direct.

Persons tendering are requested to name the colliery from which they propose to supply.

Tenders, to be endorsed "Tender for Gas Coal and Cannel," to be sent in on or before Monday, July 19 next.

The Committee do not bind themselves to accept the lowest or any tender.

JOSEPH TIMMINS, Engineer, &c.

Leigh, Lancs.

WEST BROMWICH.

AMMONIACAL LIQUOR.

THE Gas Committee of the West Brom- wich Improvement Commissioners are prepared to receive TENDERS for the Purchase of AMMONIACAL LIQUOR produced at their Albion Works, West Bromwich, for a period of Two, Three, or Four years. Separate tenders for each term required. The Liquor to be delivered into Canal barges at the Albion Gas-Works.

Further particulars and forms of tender may be obtained on application to me.

Sealed tenders addressed to me, and endorsed "Tender for Ammoniacal Liquor," must be delivered to me before the 20th of July inst.

The Committee do not bind themselves to accept the highest or any tender.

CHAS. H. BAYLEY,
Clerk to the said Commissioners.

Town Hall, West Bromwich, July 3, 1880.

WEST BROMWICH.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the West Brom- wich Improvement Commissioners are prepared to receive TENDERS for the Purchase of the Surplus GAS TAR (say 900 tons) for the year ending July 1, 1881.

Sealed tenders addressed to me, and endorsed "Tender for Gas Tar," must be delivered here before Tuesday, the 20th of July inst.

Further particulars and forms of tender may be obtained on application to me.

The Committee do not bind themselves to accept the highest or any tender.

CHAS. H. BAYLEY,
Clerk to the said Commissioners.

Town Hall, West Bromwich, July 3, 1880.

CAN THE HYDRAULIC MAIN BE ABOLISHED?

YES, very easily, by using WHITE'S AUTOMATIC GAS-VALVE.

HERE'S PROOF:—

The Burnley Corporation, Gas Department,
June 4, 1880.

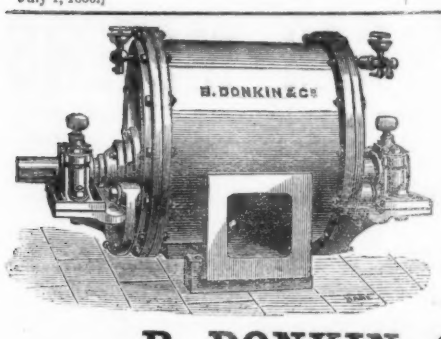
Re WHITE'S AUTOMATIC VALVES.

West's Gas Improvement Company.

Gentlemen,—We have had 186 of these Valves at work during the last 12 months. We have worked at level gauge in the Hydraulic, with the Steam Jet Exhauster, and less than 2-10ths pressure in the ascension-pipes. The pressure gauges were very steady, there being no perceptible oscillation. The Valves have done their work very well, and we are so far satisfied with them that we intend to apply them to all our Retorts.

I am, Gentlemen, yours, &c.,
(Signed) SAMUEL PETTY LEATHER,
Engineer and Manager.

NOTE.—Illustrated pamphlet descriptive of the system sent post free for 6½d. in stamps, on application to the Inventor and Patentee as above.



NEW PATENT GAS-EXHAUSTERS.

[J. BEALE'S.]

MESSRS. B. DONKIN & Co. possess the sole right to manufacture J. Beale's Exhausters under his new patent.

MADE WITH TWO OUTSIDE BEARINGS AND LATEST IMPROVEMENTS.

ALSO MANUFACTURERS OF

IMPROVED GAS AND WATER VALVES, STEAM-ENGINES, &c., &c.

B. DONKIN & Co., BERMONDSEY, LONDON.

NORTH BRITISH ASSOCIATION of GAS MANAGERS.

THE
NINETEENTH ANNUAL GENERAL MEETING
of the Members of this Association will be held in the
ACADEMY HALL, NORTH INCH, PERTH,
On THURSDAY & FRIDAY, July 8 & 9, 1880.
JAMES ROBB, Esq., PRESIDENT,
Will occupy the Chair.

PROCEEDINGS.

THURSDAY, JULY 8.

BUSINESS MEETING.

Chair to be taken at Ten o'clock A.M.

Reading of Minutes.—Admission of New Members, &c.

PRESIDENT'S INAUGURAL ADDRESS.

Auditor's Report.—Election of Office-Bearers.

READING OF PAPERS.

DINNER.

At Half-past Four o'clock, the Members and Friends will Dine together in the Royal George Hotel. Tickets for the Dinner, 4s. each, may be had from the Secretary; early application for which is specially requested.

FRIDAY, JULY 9.

Chair to be taken at Ten o'clock A.M.

Reading of Papers, &c., not completed, will be resumed.

Gas Apparatus will be Exhibited in the Hall.

LIST OF PAPERS AND COMMUNICATIONS.

1. "Retorts and Retort Settings." By Mr. JAMES M'GILCHRIST, of Dumbarton.
2. "Mechanical Scrubbers." By Mr. JAS. ANDERSON, jun., of Leven.
3. "A Few Little Things worth knowing to a Gas Manager." By Mr. THOMAS WHIMSTER, of Perth.
4. "Notes of the Cost of Working a Gas-Engine compared with the same Work done by Steam Power." By Mr. F. T. LINTON, of Leith.
5. "Gas Purification by Means of Oxide of Iron." By Mr. D. M. NELSON, of Glasgow.
6. "Jottings on the Principles Involved in Gas Manufacture." By Mr. WILLIAM YOUNG, of Clippens Oil-Works.
7. "Remarks on a New Dial for a Photometer Meter." By Mr. JAMES M'GILCHRIST, of Dumbarton.
8. "On the General Manufacture of Gas." By Mr. ROBERT SMITH, of Peterhead.
9. "Spence's Metal for Pipe-Joints." By Mr. THOMAS WHIMSTER, of Perth.

DAVID TERRACE, Secretary.

Gas-Works, Arbroath, June 24, 1880.

Imperial METER COMPY.,

LIMITED,

Makers of THE IMPROVED DRY GAS-METERS, THE PATENT WET GAS-METERS, Special Meters for Public Lighting, STATION-METERS, Governors, &c.

KING'S ROAD, ST. PANCRAS.

Formerly also (**Walter Ford**) at Gray's Inn Road.

GEORGE ORME & CO.,

ATLAS METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

Now ready, price 10s. 6d.,

AN ANALYSIS OF THE

METROPOLITAN GAS COMPANIES ACCOUNTS

For the Year 1879,

(In continuation of the previous Ten Years, 1869—1878,)

COMPILED AND ARRANGED BY JOHN FIELD,

FOR MANY YEARS ACCOUNTANT TO THE LATE IMPERIAL GAS COMPANY.

AND BY THE SAME AUTHOR,

THE COMPARATIVE AVERAGE ACCOUNT BOOK.

A few Copies of this useful Book remain on hand, and may be had at reduced charges of 15s., 10s., and 7s. 6d. each.

W. KING, Office of "Journal of Gas Lighting," 11, BOLT COURT, LONDON, E.C.

EDEN FISHER and Co., Stationers, 50, Lombard Street, London, E.C.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out* OF ACTION.

Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer, CHARLES HENRY STREET, and BISSELL STREET, BIRMINGHAM.

ALDER AND MACKAY,

MANUFACTURERS OF

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.

Original Manufacturers of Dry Meters in Cast-Iron Cases.

STATION-METERS, EXPERIMENTAL-METERS, PHOTOMETERS, & PRESSURE-GAUGES, &c.

GRANGE WORKS, EDINBURGH.

HONOURABLE MENTION.

PARIS EXHIBITION, 1878.

J. E. WILLIAMS & CO.,

SOLE MANUFACTURERS OF THE

SPECIAL METALLIC OXIDE PAINT,

Largely used by Gas Companies, Corporations, Railway Companies, Ironfounders, and Machinists.

HONOURABLE MENTION.

PARIS EXHIBITION, 1878.

It has the following qualifications and properties:—

Effectually prevents and arrests corrosion.
Has a fine gloss, and is very durable.
Does not require driers like other paints.
Protects iron from action of water.

Is not affected by sulphuretted hydrogen.
Forms a very hard, tough (not brittle) surface.
Will not crack, blister, or scale.
Is not affected by extremes of temperature.

Covers nearly double the area of other paints. (7 gallons or 1 cwt. will cover 1211 square yards of ironwork.)
Is cheaper and more economical than any other.

VICTORIA PAINT WORKS, COLLYHURST, MANCHESTER.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

Patent Steel, Wrought Iron, Copper, and other Pipes and Fittings.

EXTON BERRIDGE & PARTNERS

Beg to announce that they have succeeded in producing, by patented machinery, perfectly sound and rigid Pipes of a diameter 5 in. to 36 in., and thickness 1-16th to 3-8ths of an inch—hitherto only obtained by rivetting, and at prices which will fairly compete with cast iron and other makes.

The attention of Gas and Water Engineers, Mining and Ventilating Engineers, Shippers, and others, is invited to the many advantages arising from the use of these Pipes.

Descriptive Circulars will be forwarded free on application, and all Special Inquiries will be promptly replied to.

Orders can now be Booked for Delivery in August.

WESTMINSTER WORKS: 127, PAGE STREET, LONDON, S.W.

GOLDSMITH'S PATENT SIGHT WATER-LINE INDICATING GAS-METER.

MANUFACTURED BY GUEST AND CHRIMES,

FOUNDRY AND GENERAL BRASS WORKS,
ROTHERHAM;
AND 85, SOUTHWARK ST., LONDON, S.E.

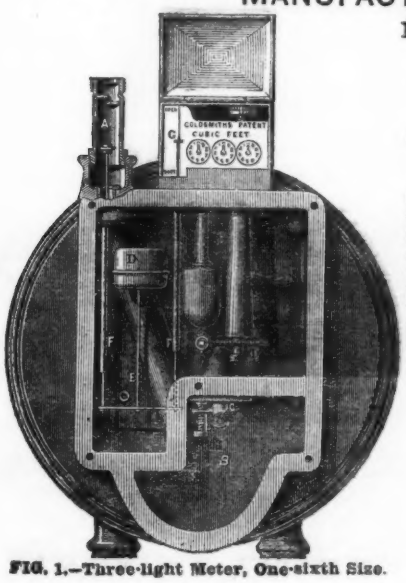


FIG. 1.—Three-light Meter, One-sixth Size.

Fig. 1 is a Meter with front removed to show the arrangement and connection of the Indicator and Valve.

Fig. 2 is front view of Index, with cover up.

The principal object of this invention is to render the water-line in the reservoir at all times visible. It will be seen, by reference to the illustrations, that this is accomplished in the following manner:—On the dial are the words "Open" and "Shut," and attached to the float is the pointer G, which rises and falls with the water-line in the reservoir. If the pointer is at "Open," it shows that the valve is open, and that the reservoir is full. If it is at "Shut," it shows that the reservoir is empty, and that the gas will be shut off.

The following ADVANTAGES will be obvious:—

1. The Inspector can see at a glance if the Meter requires water.
2. No more water than is required need be added, and therefore no water has to run out.
3. The Meter Inspector will be spared a great deal of his most objectionable work, and he will save a great deal of time and trouble.
4. The consumer will not always have to be asked for water, nor will he have to endure the unpleasant smell caused by waste water being run out.

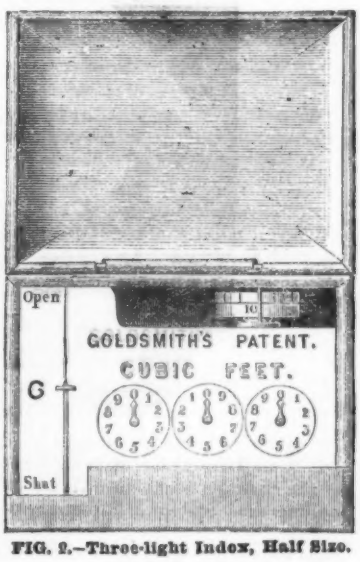


FIG. 2.—Three-light Index, Half Size.

BRILLIANT WHITE SILENT LIGHT.

WILLIAM SUGG'S
CELEBRATED PATENT GAS-BURNERS,

PREVENTING WASTE AND FLARING.

THE PATENT "LONDON" ARGAND,

The only Government Standard Burner for London and the Provinces, Canada and the Colonies, besides being largely used in the United States of America and elsewhere.

"THE VERY BEST BURNER YET CONSTRUCTED."—*Vide* GAS REFEREES REPORTS, 1869 AND 1871.

The "London" Governor Argand Burner and Westminster Shade and Screen.

The "London" Governor Argand Burner, Viennese Pattern Shade and Screen.

BRONZE MEDAL, PARIS, 1867.

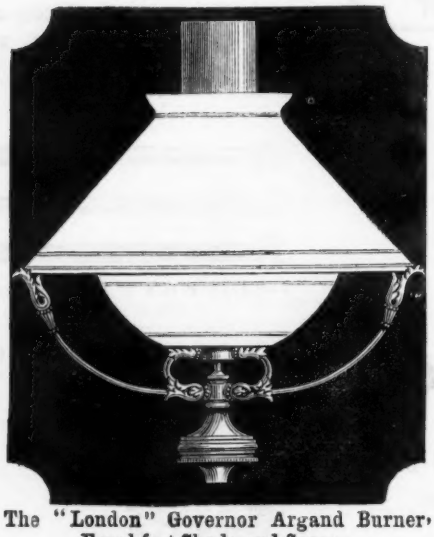
GOLD MEDAL, 1878.

TRADE MARK. EN AVANT.

BRONZE MEDAL, LONDON, 1862.

DIPLOMA, LONDON, 1871.

THE ONLY MEDAL AWARDED FOR BURNERS, YORK, 1879.



The "London" Governor Argand Burner, Frankfort Shade and Screen.

The "London" Governor Argand Burner, Italienne Shade and Screen.

The Shades can be supplied in Plain or White Albatrine, or decorated in colours in various styles.

These Burners are made in sizes ranging from 16 to 1000 candle Illuminating Power, the larger sizes being highly suitable for the Lighting of Lecture Halls, Theatres, &c., as well as for Public Illumination, in specially-constructed Lanterns, as set forth in my Improved System of Street Lighting.

For Particulars, Lists, Photos, &c., apply to

WILLIAM SUGG, ENGINEER, CHARING CROSS, & VINCENT WORKS, WESTMINSTER.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

LONDONDERRY GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES.

COUNTY OF DURHAM.

For Prices and Particulars, apply to

MR. S. J. DITCHFIELD,

LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

London Agents: Messrs. LAMBERT BROS., 85, GRACECHURCH ST., E.C.

J. & H. ROBUS,

BUILDERS AND CONTRACTORS

FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

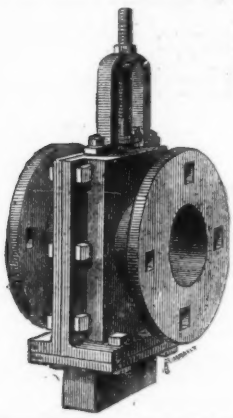
RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

N.B.—All kinds of Fire Goods and Gas Apparatus supplied on the shortest notice.

Address:—J. & H. ROBUS, BELL GREEN, CATFORD, LONDON, S.E.



IMPROVED

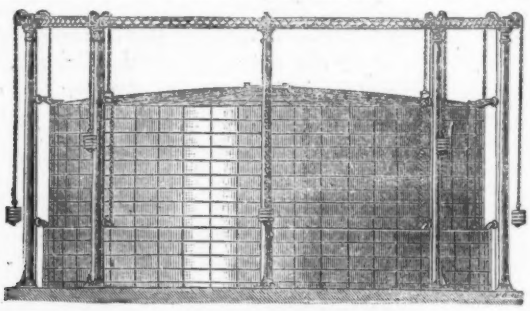
BRIDGE VALVES

For Regulating the Seal of Hydraulic Mains in Gas-Works.

These Valves are so arranged that, when once adjusted for the proper overflow, they can be closed entirely and *opened* again without altering the adjustment.

B. DONKIN & Co.,

BERMONDSEY, LONDON, S.E.



J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

WOOD TROUGHING

For Preserving Service-Pipes.

Price from Three-Farthings per Foot.

In any Lengths.

THOS. PROUD,

Brookfield Works, Icknield St., Birmingham.

PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. Price, Inventor and Patentee, Gas-Works, Hampton Wick, Middlesex.

Prices are Reduced.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, Ghent.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. Sugg & Co., Ghent, will receive immediate attention.

JAMES NEWTON & SONS,

(Established 1820,)

FIRE-BRICK AND TILE MERCHANTS,

Wholesale and for Exportation,

FALCON DOCK, 78 and 79, BANKSIDE,

SOUTHWARK, LONDON, S.E.,

Depôt for STOURBRIDGE and NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

IMPORTANT to GAS COMPANIES.

ENORMOUS SAVING.

JOHN ABBOT & CO., LIMITED,

of Suffolk Lane, London, and Gateshead,

Manufacture and Erect

HYDRAULIC CRANES

For Discharging Coal Barges;

WAGGON HOISTS

For Lifting Coals to Retort-House Stageway;

CAPSTANS

For Moving Trucks about the Yard,

And Apparatus for Lifting PURIFIER COVERS.

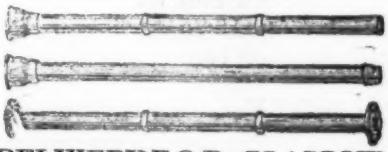
Examples to be seen at Beckton, Hull, &c., &c.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

70, ST. ENOCH SQUARE, GLASGOW.

CAST-IRON GAS AND WATER PIPES.



DELIVERY F.O.B., GLASGOW.

Prices on application.

BOX'S PATENT STREET GAS-LAMP

Has the following good qualities:—

1. No putty or other material is required for glazing. Thus there is no hacking out of old putty on removal of the glass, with the *consequent damage* to the lamp frames. 2. No liability to breakage by unequal expansion of the glass caused by changes of temperature. 3. Any inexperienced workman can glaze the lamp in a few minutes. 4. The system of glazing can be applied to any existing lamp at a trifling cost. 5. It is cheap, strong, and durable. 6. The glass can be easily removed so that the frames can be thoroughly painted inside and out.

The lamp may be supplied fitted with clear opal or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing lamps to this system can be supplied at moderate prices and a small charge for royalty. Licences granted on the most reasonable terms. For further particulars apply to the Patentee,

Gas-Works, Crayford, Kent. W. W. Box,

BRAY'S
PATENT LANTERN AND FLAT-FLAME BURNERS.

80-CANDLES POWER. Scale 1 inch to foot.
To be Lighted by ordinary Torch, or one Flash Jet.
Arrows show direction of regulated Column of Air.

The understated declaration with which we introduced our apparatus has been fully borne out by general experience—namely, that

"THE FLAT-FLAME IS THE ONLY PRACTICABLE SYSTEM FOR STREET LIGHTING; and, 'in actual use,' yields as much light with Common Gas, and more with Cannel Gas, than any Argand System."

BIRMINGHAM LAMP TESTS

AFTER the most exhaustive series of experiments, extending over more than twelve months, with the most extensive assortment of Burners and Lanterns of large lighting power ever brought together, the Birmingham Authorities have

ADOPTED BRAY'S SYSTEM

for their Street-Lighting Improvements, for which purpose Sixty-Five 100-candle power Lanterns of medium lighting power are immediately required.

The apparatus used in the above tests were all of our usual medium lighting power class, and the tests showed that we sacrifice a considerable amount of lighting power for the sake of general efficiency. The tests further showed that our 80*-candle* HIGHEST *lighting power burner yielded* 3·51 *candles per foot of gas (the quality being* 16·75—3·35 *per foot—by the standard), which was a higher result than that yielded by any other flat-flame burner, and higher than the* 80*-candle power Argands.*

NOTE.—The above is the most conclusive answer to certain misleading statements which are being made by a prominent defeated competitor.

Extract from the *Leeds Mercury*, April 1, 1880.

At the meeting of the Leeds Town Council, March 31, Alderman Gaunt moved that the Council approve of the acceptance by the Corporate Property Committee of the tender of Messrs. Geo. Bray and Co. for the supply of 21 new lamps, to be placed upon the pillars round the Town Hall. The Committee had tested Sugg's and other lamps, and found Messrs. Bray's the best. It was intended to have two 200-candles power and two 100-candles power, and 17 round the hall of 80-candles power. Mr. Lynd, in seconding the motion, said that he had had an opportunity of seeing different lamps tested at Birmingham, and he was in favour of Messrs. Bray's.

Extract from the *Daily Free Press*, Aberdeen, Jan. 1, 1880.

Judging of the merits of the lights as they appeared last night, on-lookers seemed to be generally of opinion that between Sugg's patent and Bray's larger light at the corner of Union Buildings, Castle Street, there was no perceptible difference in the illuminating power. When the vital question of gas consumption is taken into account, it is found that in the Castle Street lamps there is a marked difference in the quantity of gas consumed, for while 30 feet of gas are hourly burned in Sugg's Patent Lamp, only 20 feet are used by Bray's Lamp during the same period.

[The above Lamps have Meters attached.]

Bray's Lanterns have been adopted by the Vestry of St. George, Hanover Square, London, for all the crossings and refuges of that important district, after a direct competition with the Argand system of lighting; and also by about 50 Towns and Vestries, after a similar competition in most cases.

GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.

SMEATON'S TRAPLESS CLOSETS.

MESSRS. W. SMEATON & SONS.

HOT WATER AND SANITARY ENGINEERS.

PATENTEES AND INVENTORS OF THE
TRAPLESS, THE D TRAP, AND EDDYSTONE CLOSETS.
Also the New
ECLIPSE COMBINATION CAST LEAD TRAP.

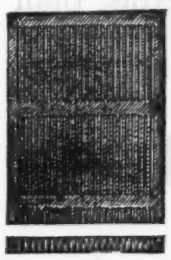
The Price will be half of the old-fashioned D Trap, it being cast all in lead, without a Joint. Send at once for an Illustrated Price List to their Wholesale and Retail Agent,

G. R. GLENIE,

WALBROOK HOUSE, 37, WALBROOK, LONDON, E.C.

A large Discount to the Trade and Shippers. Estimates Given and Contracts Taken.

R. DEMPSTER AND SON'S



WOOD SIEVES FOR PURIFIERS,

WITH TAPER OR PARALLEL BARS,

MADE BY SPECIAL MACHINERY.

SCRUBBERS FILLED WITH BOARDS,

On our approved principle, for the extraction of Ammonia.

Prices on application. References to First-Class Engineers.

ROSE MOUNT IRON-WORKS,

ELLAND, Near HALIFAX.

London Offices: 2, SUFFOLK LANE, CANNON STREET, E.C.

J. & J. BRADDOCK,

GLOBE METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY CONSUMERS GAS-METERS,

OF THE HIGHEST EXCELLENCE ONLY;

ROUND STATION-METERS,

ON CAST-IRON STANDS;

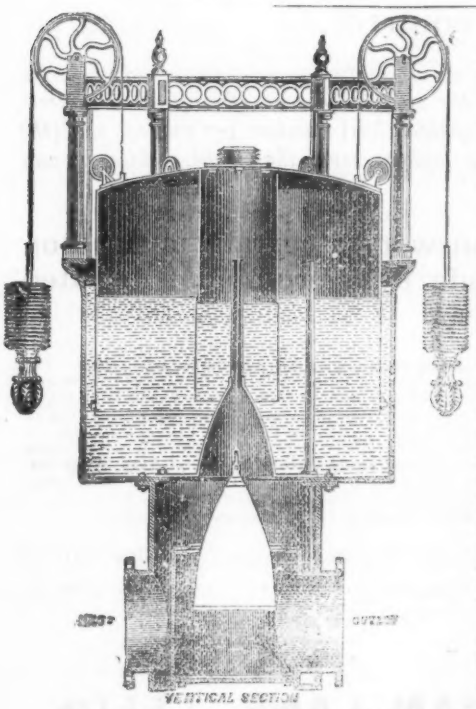
SQUARE STATION-METERS,

WITH PLANED JOINTS.

Messrs. Braddock beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 30-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

C. & W. WALKER'S

WOOD PURIFIER SIEVES,

Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,
DONNINGTON, Near NEWPORT, SHROPSHIRE.
FINSBURY CIRCUS, LONDON.

MOBBERLEY & PERRY,

FIRE CLAY and BRICK WORKS,

STOURBRIDGE.

Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAY.
Manufacturers for Home and Export.
GAS-RETORTS, GLASS-HOUSE FURNACE,
BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,
And Every Description of Best Fire-Bricks.

TROTTER, HAINES, & CORBETT,

BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
Shipments Promptly and Carefully Executed.

ESTABLISHED IN 1860.

BENJAMIN CARPENTER,

THE ORIGINAL MANUFACTURER OF
THE IMPROVED

WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

PROVIDENCE WORKS,
22, HERMES STREET, PENTONVILLE ROAD,
LONDON, N.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD,
CITY ROAD, LONDON, N.,

Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

Note.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

GEORGE'S

Patent Gas Calorigen,

A STOVE FOR

WARMING AND VENTILATING.

Recommended by Dr. Richardson.

Manufacturers:

J. F. FARWIG & CO.,

36, QUEEN STREET, CANNON ST., LONDON.

Gold Medal Awarded, Paris Exhibition, 1878.

THOMAS TURTON AND SONS,

SHEAF AND SPRING WORKS,

SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS,

STEEL OF ALL DESCRIPTIONS,

SCREW STOCKS, TAPS, AND DIES, SPANNERS,
RATCHET BRACES, LIFTING-JACKS,
ANVILS, VICES,
AND ENGINEERS TOOLS GENERALLY.

LONDON OFFICE:

90, CANNON STREET, E.C.

THE MANN & WALKERS' PATENT SCRUBBER.

Extensive use.

The successful and extensive use of the Mann and Walkers' Patent Scrubbers in all parts of the world has demonstrated their advantages, and entitled them to be received with credit and confidence. The number of them in use is about twenty times that of any other known means of purifying gas from ammonia.

Small quantity of Water required.

By a very small quantity of clean water (not more than 5 or 6 gallons per ton of coals carbonized) the whole of the Ammonia contained in the Gas is completely absorbed; the Gas, after only once passing through, issuing from the Scrubber outlet completely purified from Ammonia. The Scrubber gives no appreciable back pressure.

Residual Product obtained.

The Residual Product—namely, the Ammoniacal Liquor—is obtained at from 20 to 30 ounces commercial strength, which enables it, after being mixed with the weaker Liquor from the hydraulic main and condensers, to be sold to the Manufacturing Chemists, or converted into Sulphate, at the degree of strength found most profitable to the Gas Company.

Illuminating power increased.

The Scrubber is a Saturator, and the Gas being soaked in this strong solution of Ammonia in the lower columns of the Scrubber, is purified from a large amount of Carbonic Acid, and its Illuminating Power is thereby increased.

Small amount of power required.

The friction is so little, and the motion so slow, that the power necessary to work the Scrubber is almost inappreciable. A small gas-engine will work a pair of Scrubbers, purifying 2 million cubic feet of gas per day.

Beckton Gas-Works.

There are thirty of these Patent Scrubbers in the Beckton Gas-Works, equal to purifying 30 million cubic feet per day, and the total amount of engine power necessary to work the whole 30 is not equal to that given out by one 10-horse engine.

Reserve purifying power contained.

There is also a most important advantage arising from the height of these Scrubbers, in the reserve force contained in them. In the event of any stoppage, the mass of soaked and wetted material would continue the purification for hours, even if the supply of water and working were stopped from any cause.

Internal Materials not changed.

The changing of the soaking materials in these Scrubbers is very seldom required; they are well known to remain in action for seven years without being emptied.

Guarantee

They are in all cases erected under guarantees; they easily fulfil the stipulations of any Act of Parliament, and the chemical restrictions of the Board of Trade; and in cost they are much less to a Gas Company than any other known means of purifying Gas from Ammonia.

C. & W. WALKER.

8, *Finsbury Circus, London, E.C.*

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

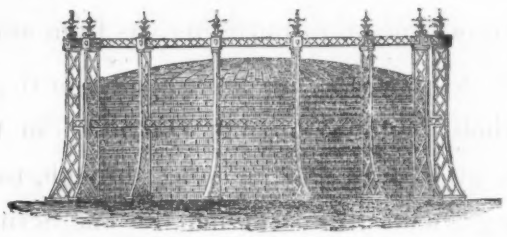
ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

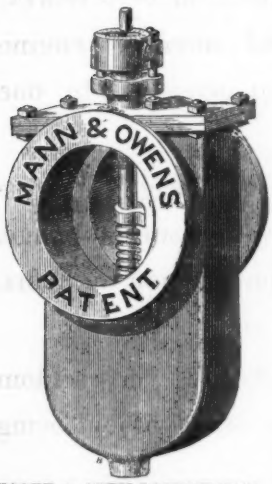
HYDRAULIC, GAS, AND GENERAL ENGINEERS,

WHITEFRIARS STREET, LONDON, E.C.

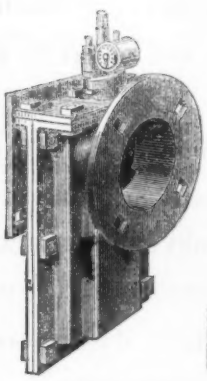
Sole Manufacturers of MANN & OWENS'

PATENT SCREW & CAM GAS-VALVE,

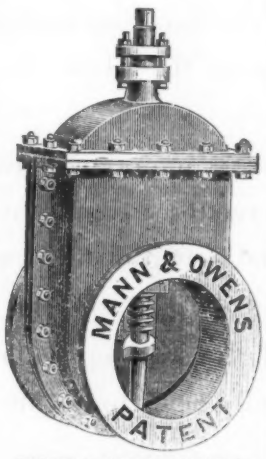
Protected by Royal Letters Patent in England, France, Belgium, & the United States of America.



VALVE to OPEN DOWNWARDS.



BRIDGE-VALVE
for Regulating the Seal of
Hydraulic Mains.



VALVE to OPEN UPWARDS.

The SPECIAL ADVANTAGES of MANN AND OWENS' PATENT VALVE are as follows:—

1. Its non-liability to become set fast through varying temperature or from the deposit from crude gas. 2. It is made absolutely gas-tight by the simple action of a screw and cam. 3. Inconvenience through the breakage of springs or wedges setting fast cannot arise. 4. The face of the Valve is scraped and cleaned of any solid matter at each operation of opening or closing.

The Valve can be had to work either in a Vertical or Horizontal position.

Every Valve is carefully tested under pressure, and warranted perfectly sound and gas-tight.

INSTRUCTIONS FOR ORDERING.

State whether required for above or below ground, if Double Flange or Socket and Spigot Valves are wanted, or with loose Flanged Socket and Spigot pieces.

The Prices include Indicators to show extent to which Valve is open.

Also makers of PILLAR-VALVES, SELF-ACTING BYE-PASS VALVES, OUTSIDE RACK AND PINION VALVES, HYDRAULIC-MAIN VALVES, DISC-VALVES, &c.

Every description of Pumping Apparatus, Hydraulic Lifts, &c., suitable for use in Gas-Works, made to order.

PRICES, SIZES, AND FULL PARTICULARS, WITH COMPLETE ILLUSTRATED CATALOGUE, FURNISHED ON APPLICATION.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

MECHANICAL AND CONSULTING GAS ENGINEER

NORWOOD, NORTHENDEN ROAD,

SALE, NEAR MANCHESTER.

SANDELL AND SON,

PUBLIC ACCOUNTANTS,

2, GREAT GEORGE STREET, WESTMINSTER.

SANDELL AND SON having been engaged during the past 25 years in Gas Companies Accounts, either in Preparing or Investigating Statements for Parliamentary Applications, Arbitrations, and otherwise, offer with confidence their Services for similar purposes.

ALFRED LASS, F.I.Accts.,

SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

30, GRACECHURCH STREET, LONDON.

Accounts Analysed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

OXIDE OF IRON.

Gas Companies can be supplied with any quantity of Natural Oxide suitable for Gas Purification purposes. Shipped direct from the extensive estates in Co. Donegal of the Earl of Leitrim and Wybrants Olphert, Esq., D.L.

By thus purchasing from the producer a constant supply of the purest material will be ensured to the Gas-Works, and intermediate profits will be saved to the Shareholders.

For terms, references, and particulars apply to

JOHN BEATTIE,

FALCARAGH, CO. DONEGAL, IRELAND.

THOMAS PROUD,

BROOKFIELD WORKS,

103, ICKNIELD ST., BIRMINGHAM,

MANUFACTURER OF

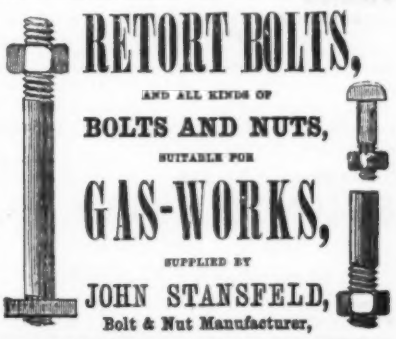
WOOD GRIDS

FOR

PURIFIERS AND SCRUBBERS,

AND

GENERAL STEEL AND IRON TOOLS AND MATERIAL USED IN GAS-WORKS.



RETORT BOLTS,

AND ALL KINDS OF

BOLTS AND NUTS,

SUITABLE FOR

GAS-WORKS,

SUPPLIED BY

JOHN STANSFELD,

Bolt & Nut Manufacturer,

ALFRED ST., BOAR LANE, LEEDS.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

HARTHILL CANNEL

Yields 14,920 cubic feet of 40·92-candle gas per ton.

THRASHBUSH CANNEL

12,530 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash. This cannel is almost free from sulphur.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full analyses on application at above address, or from WEDDERSPOON, FERGUSSON AND Co., 21, Lime Street, LONDON, E.C.

HEBBURN MAIN GAS COAL.

This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

For references and prices, either f. o. b. or by rail, apply to

W. RICHARDSON,

29, QUAYSIDE, NEWCASTLE-ON-TYNE.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.E.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

GAS COAL.

THE Tawd Vale Colliery Company, Limited, are prepared to Contract for the Supply of their superior Arley and other GAS COALS, and to send samples to the order of Gas Engineers and others, or complete Analysis, on application. Shipped at Liverpool, Preston, Fleetwood, Garston, or Birkenhead.

Mr. James Paterson, C.E., F.G.S., in his analysis of T. V. Arley Coal, says: "Some parts merge into a semi-Cannel; gas per ton, 10,300 cubic feet; illuminating power, 16·96 candles; coke of high quality, 1431 lbs. per ton."

Collieries, Skelmersdale, near Ormskirk; Offices, 5, New Hall, Old Hall Street, LIVERPOOL.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

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Supply and Erect Street Lamp Columns, together with Head Irons and Lanterns, as well as all the other fitting connected therewith.

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THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

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Analyses and Quotations on application.

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Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

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PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Twenty-Eight Illustrations and Letterpress, on the Construction of Gas-Works, will be sent, post free, on receipt of 4s. in stamps To be had of the AUTHOR; or at the Office of the "JOURNAL OF GAS LIGHTING."

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

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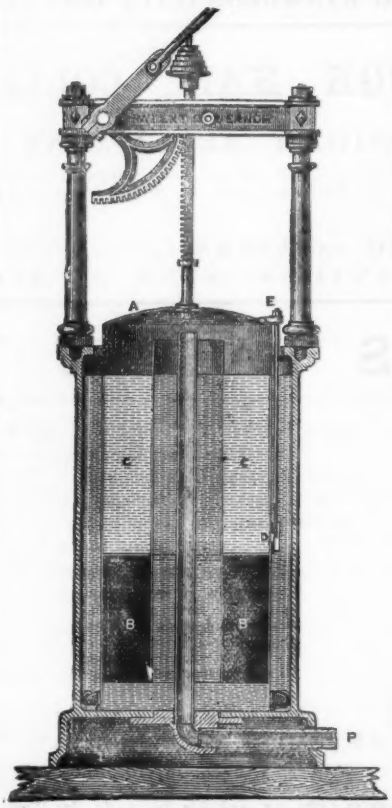
GEORGE WALLER & CO.,

GAS AND HYDRAULIC ENGINEERS,

Patent Compensating Steam Governor,

WITH SELF-CONTAINED WATER-BALANCE.



This is the most efficient and perfect Governor yet made to control and regulate the speed of Engines and Exhausters according to the varying make of gas, and maintain a steady gauge, whether working level or with six inches of seal.

It is the only Governor that will effectually control Condensing and Compound Engines, especially when the Exhauster is on light work, and the Engine is large.

During the drawing and charging of Retorts, the Engine requires no attention—a matter of great importance in small works.

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They are in use at
BECKTON,
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DUKINFIELD,
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RAMSGATE,
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and about 30 other works.

G. W. and Co. make **special Steam Throttle Valves,** suitable for working with this Governor, and alter existing Throttle Valves to same plan.

See also advertisement, page 28.

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ALDWARKE MAIN AND CAR HOUSE COLLIERIES,

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The Aldwarke Main Brights is a first-class gas-making and coking Coal, yielding by analysis 12,600 feet of 19-candle gas per ton, and giving "Weight of illuminating matter in lbs. of sperm, 320·80." It is very free from impurities and foreign matter.

Copies of Analyses made by Gas Companies who have used it will be forwarded and Samples sent on application.

THE LOCHORE & CAPLEDRAE CANNEL COAL COMPANY,

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Beg to intimate that the development of their Mines is progressing favourably, and that they are now in a position to supply their famous Cannels.

Quotations and full Analyses will be supplied on application addressed to the Company,

LOCHGELLY, FIFESHIRE, N.B.

Abstract of Analyses made by Dr. WALLACE, Gas Analyst for the City of Glasgow.

	Cubic Feet per Ton.		Illuminating Power.		Equivalent of a Ton in Sperm.
Plesio Boghead	13,165	....	36·16	....	1632
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GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

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This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

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MIDLAND DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: A. C. SCRIVENER,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

THE BLAINSCOUGH HALL COLLIERY COMPANY.

BEST WIGAN ARLEY GAS COAL.

Yielding (as per analysis) 11,970 cubic feet of 16·39 candle gas per ton. Copies of analyses and testimonials from **Gas Companies** and **Managers**, who have used the Coal in large quantities for several years, will be forwarded on application.

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LIVESEY'S PATENT WASHER.

This apparatus effects the most intimate contact between the liquor with which it is supplied and the gas passing through it, resulting in the complete removal of all particles of tar, increasing the ammonia strength of the scrubber and condenser liquor, and removing a large proportion of other impurities—notably, carbonic acid. The Washer is intended to work in conjunction with a scrubber. It occupies little space, and is inexpensive. It does not become clogged with tar or corroded by the action of the liquor or gases, it gives three inches of pressure, and only needs a supply of liquor to keep it in regular action without any further attention. It has been in constant successful use for five years, and is now in operation in upwards of fifty places.

Prices, fitted and fixed complete, exclusive of Valves and Connections; all foundations and unskilled labour required in erection to be provided by the Gas Company:—

Quantities to pass in cubic feet per 24 hours	100,000	250,000	500,000	750,000	1 million	1½ million	2 million	3 million	4 million
Price each	£30	£50	£70	£95	£120	£165	£200	£280	£360

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Messrs. WILLEY AND CO., Commercial Road, EXETER, for West of England and South Wales;

Or to the PATENTEE, 589, OLD KENT ROAD, LONDON, S.E.

NEW PATENT WET GAS-METER,
THE "RELIANCE,"
MANUFACTURED BY THE
GAS-METER COMPANY, LIMITED,
238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.
SOLE AGENT FOR SCOTLAND: JAMES KEITH, EDINBURGH AND ARBROATH.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

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ALEXANDER WRIGHT & CO.
WET & DRY GAS METERS.
STATION METERS AND GOVERNORS.
JONES'S THROTTLE-VALVE GOVERNORS.
JONES'S DISTRICT GOVERNOR,
The simplest and best Instrument extant for checking Excess of Pressure in hilly districts.
GAUGES AND TESTING APPARATUS OF ALL KINDS FOR GAS.

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Manufacturers of
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THE UNVARYING WATER-LINE GAS-METERS,
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STATION-METERS, ALL SIZES, with PLANED JOINTS;
Experimental Meters, Photometers, Pressure-Gauges, Governors, Test Holders, &c., &c.
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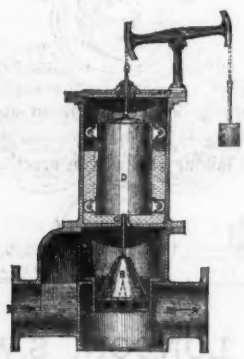
PEEBLES'S
PATENT GAS GOVERNORS,
FOR
Stations, Districts, Public Lamps, & Dwelling-Houses,
Are meeting with increasing favour, and giving full satisfaction where they are in use.

Wet and Dry Gas-Meters of Superior Excellence, Station-Meters, &c.

Prices and Illustrations Post Free on Application.


Patent Safety Station-Governor.

D. BRUCE PEEBLES & CO.,
TAY WORKS, BONNINGTON, EDINBURGH.

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